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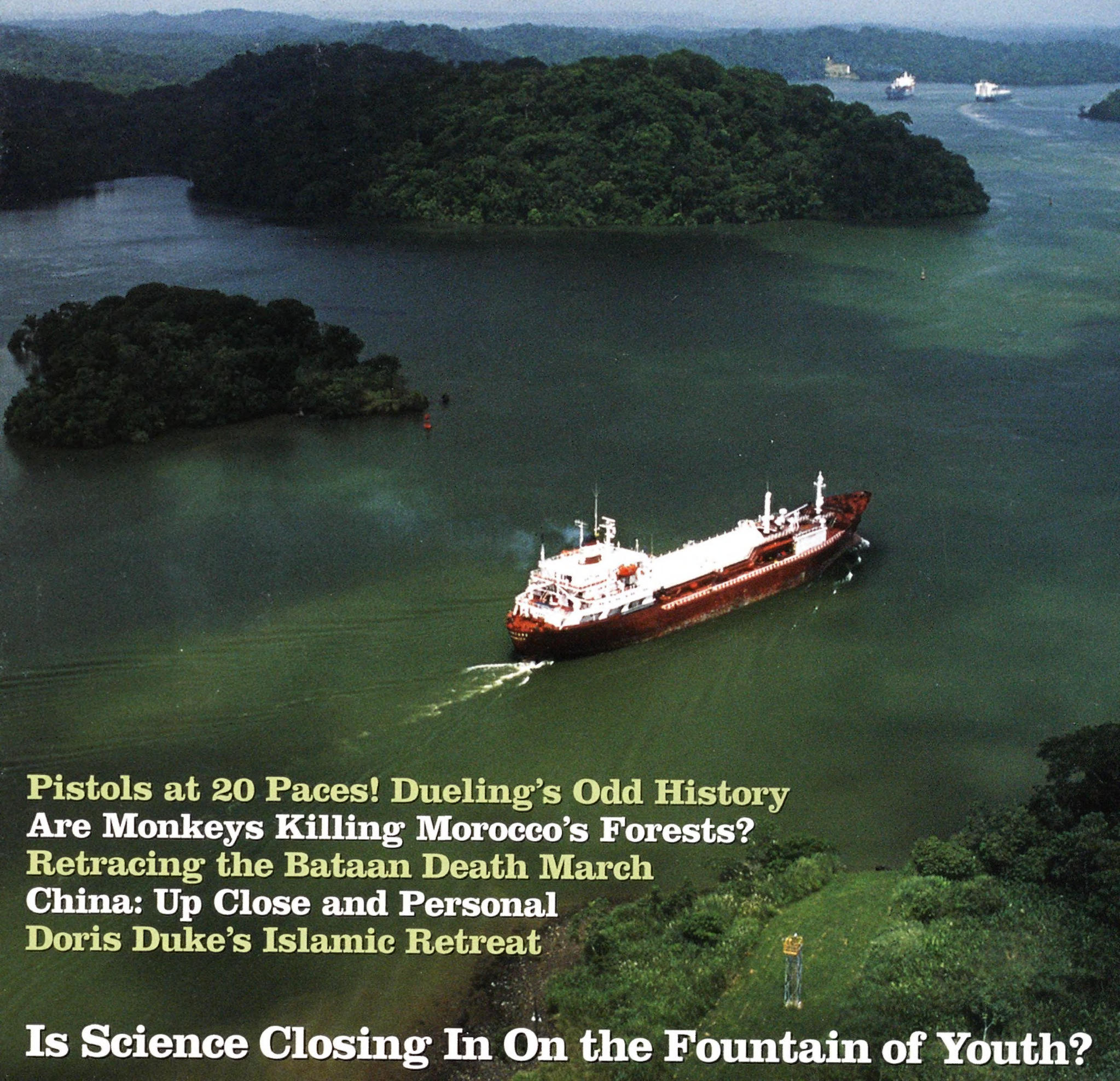
MARCH 2004

After the U.S. Pullout

PANAMA
DEFYING EXPECTATIONS



Pistols at 20 Paces! Dueling's Odd History
Are Monkeys Killing Morocco's Forests?
Retracing the Bataan Death March
China: Up Close and Personal
Doris Duke's Islamic Retreat

Is Science Closing In On the Fountain of Youth?

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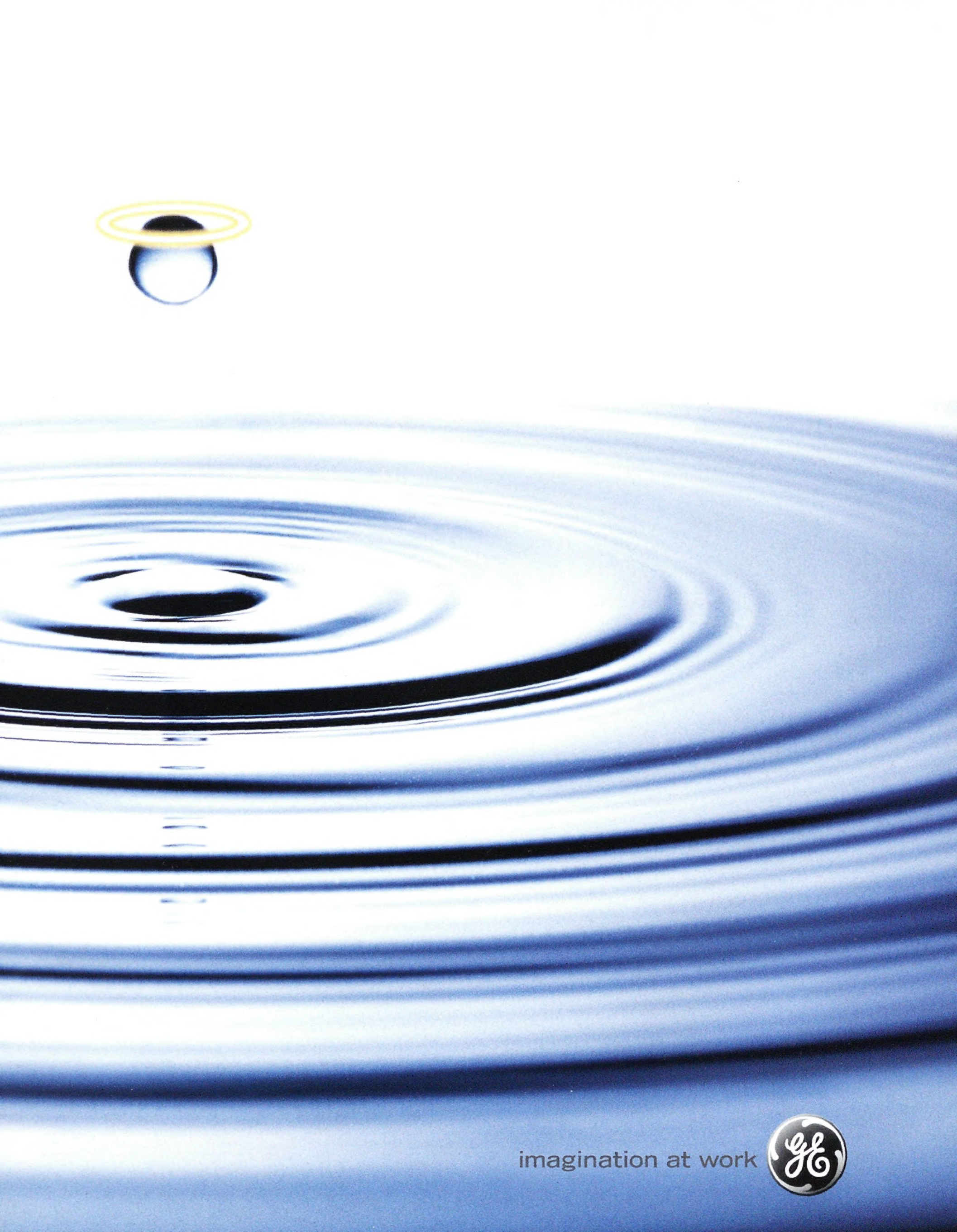
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MARCH 2004 VOLUME 34, NUMBER 12

FEATURES

"ALTHOUGH DUELING ETIQUETTE had been codified for centuries, combatants still tested the limits of form. Adversaries slung piles of dung, beaned each other with billiard balls and fought while suspended by balloons."
"DUEL!" PAGE 94

70 Doris Duke called her over-the-top creation Shangri La, from the 1937 film *Lost Horizon*.

88 The Photovoice project in China has yielded 50,000 photographs so far.

56 Scientists specializing in extending human life are no longer dismissed as charlatans.

44 PANAMA RISES

The nation, now 100, runs the great canal itself with surprising efficiency and reaches out to eco-tourists

BY BOB CULLEN / PHOTOGRAPHS BY BRIAN SMALE

56 KENYON'S AGELESS QUEST

Scientist Cynthia Kenyon and her colleagues—using data from a lowly worm—are convinced they can develop drugs that will slow the process of aging

BY STEPHEN S. HALL

64 MONKEY IN THE MIDDLE

Moroccan forestry officials blame the Barbary macaque for the country's deforestation; primatologists say officials are barking up the wrong tree

BY JOHN F. ROSS / PHOTOGRAPHS BY ENRICO FERORELLI

70 DORIS DUKE'S ISLAMIC ART RETREAT

Tobacco heiress Doris Duke's vast collection of Islamic art—the most spectacular in the United States—dazzles visitors to her Hawaiian hideaway turned museum

BY DOUG STEWART / PHOTOGRAPHS BY DAVID FRANZEN

80 IN THEIR FOOTSTEPS

More than 60 years have passed since the Bataan Death March, on which one in six of some 70,000 Allied POWs forfeited their lives

BY DONOVAN WEBSTER / PHOTOGRAPHS BY CHIEN-CHI CHANG

88 VISIONS OF CHINA

Using disposable cameras supplied by the Nature Conservancy, rural villagers in the Yunnan Province in China focus on everyday moments

BY MARLANE LIDDELL

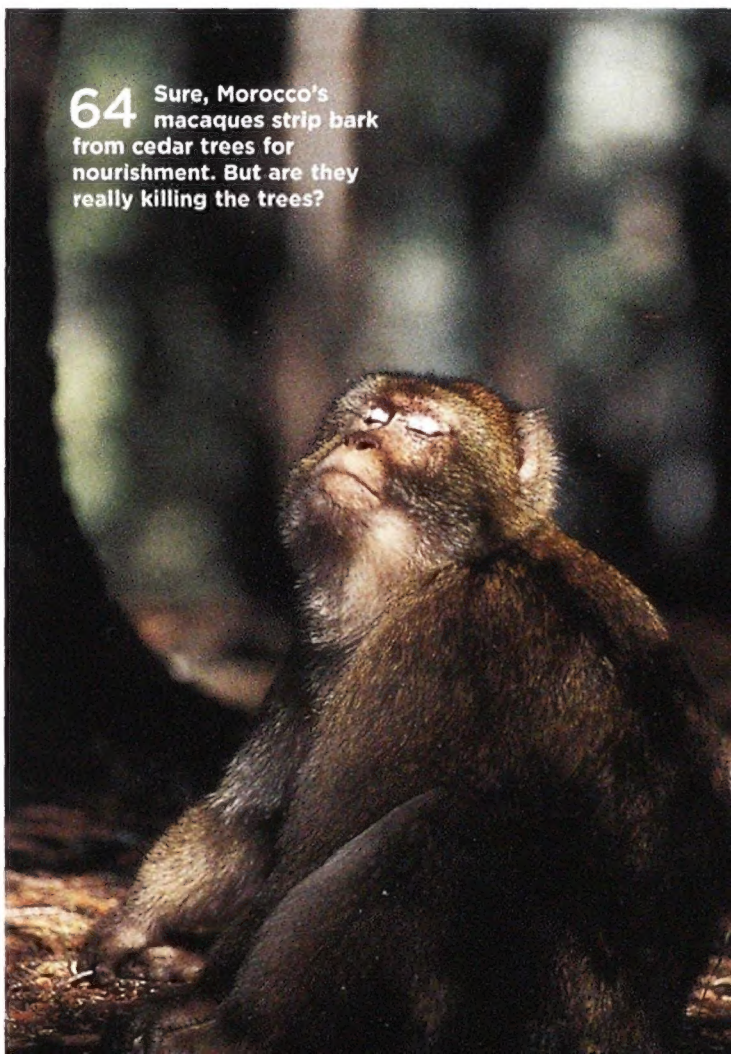
94 DUEL!

In 19th-century America, men of a certain class—and even the occasional woman—were obsessed with personal honor; it cost too many of them their lives

BY ROSS DRAKE

ON THE COVER Four years after the U.S. turnover, the Panama Canal is bustling with some 26,000 crossings each year. *PHOTOGRAPH BY DANNY LEHMAN / CORBIS.*

80 Sixty years have passed since the word "Bataan" became synonymous with "sacrifice."



64 Sure, Morocco's macaques strip bark from cedar trees for nourishment. But are they really killing the trees?

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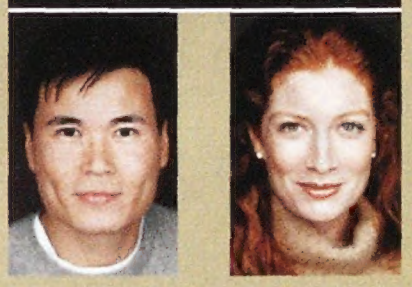

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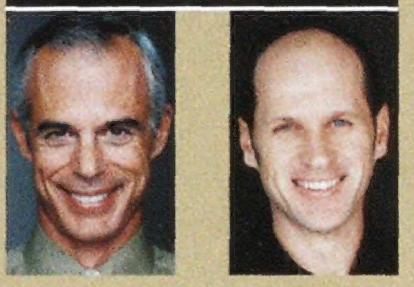

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DEPARTMENTS

"IT SOUNDS LIKE the plot of a three-hankie biopic: a ruggedly handsome fellow comes out of nowhere, becomes the top draw at a world's fair, then goes to pieces and is reduced to working as a carnival huckster."

— *"RETURN OF A GIANT," PAGE 27*

25 King of Swing Artie Shaw says he hasn't touched a clarinet in half a century.

39 Conceptual artist Sol LeWitt helped push art off the canvas and into the realm of ideas.

21 Esther Bubley's image of a train platform in New York calls to mind an Edward Hopper canvas.

106 Hired by a filmmaker to handle captive animals for a documentary film about wildlife in Belize, Sharon Matola kept the animals—and started that Central American country's first zoo.

21 INDELIBLE IMAGES *Private Eye*

Whether of sailors on leave or commuters on edge, Esther Bubley's postwar photographs capture an America in transition *BY BEVERLY W. BRANNAN*

25 THE OBJECT AT HAND *Magic Wand*

Big-band music would never be quite the same once clarinetist Artie Shaw, today still feisty at 93, began the beguine *BY OWEN EDWARDS*

27 POINTS OF INTEREST *Return of a Giant*

One hundred-year-old Vulcan, the Iron Man of Birmingham (and wonder of the 1904 St. Louis World's Fair) is back on top *BY JEFF BOOK*

30 PHENOMENA & CURIOSITIES *Signal Discovery?*

A California scientist says living cells make distinct sounds, which may someday help doctors "hear" diseases *BY MARK WHEELER*

106 PEOPLE FILE *Zoo Story*

Sharon Matola, founder of the Belize Zoo, has tried her hand at everything from circus performing to disc jockeying *BY ADELE CONOVER*

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War, Honor and...Cats

After such knowledge, what forgiveness?

BY CAREY WINFREY

Webster: Admiring.

FOR "IN THEIR FOOTSTEPS" (p. 80) Donovan Webster retraced the torturous 65-mile forced march in the Philippines by captured American and Filipino soldiers in 1942. With every step he took, his admiration for the G.I.s grew. "I was there at roughly the same time of year as the prisoners, and the temperatures were sweltering. I hadn't just spent four months fighting in the jungle with little in the way of supplies, and I wasn't sick, as most of the troops were in 1942." Today the Death March route is paved with asphalt and packed with cars and motorcycles. In towns, the air is blue from vehicle exhaust. "But along the road," says Webster, "there are banana and rubber trees and kids selling seafood from shacks. It's actually quite beautiful."

"You might assume that Alexander Hamilton's famous duel with Aaron Burr had to be some kind of fluke—that Americans busy casting off the aristocratic traditions of Europe wouldn't have much use for ritual gunplay over arcane points of honor, especially when it cost a life as valuable as Hamilton's," says Ross Drake, who wrote "Duel!" (p. 94). In fact, dueling in pre-Civil War America remained a lively tradition, with its own set of formalities (widely abused in practice), preferred combat venues (often chosen to evade legal scrutiny) and a gallery of dangerous characters. Hamilton wasn't the first, even in his own family, to die on the so-called field of honor, and, regrettably, he wasn't the last. So why did sensible men take such risks? "The reasons," says Drake, "—temper, pride, fear of humiliation—may not seem compelling today, but at the time were hard to ignore."

Drake: Unassuming.

A WORD ABOUT OUR 2003 PHOTO CONTEST. We received more than 12,000 entries! Our director of reader services, Karla Henry, did the counting (bless her heart) and reports: "For the Natural World category we got a lot of deer, large water birds and pets. But the most common entries were close-ups of flowers, especially flowers with insects, and most especially, purple coneflowers with butterflies. For People, we got a lot of baby pictures and pictures of the elderly. For the Arts, we got tons of statues and paintings. The most popular Americana subjects were Civil War and Revolutionary War reenactors. And cats! We have cats entered in Americana, the Arts, the Natural World, Travel and, believe it or not, in People."

As promised, we plan to notify finalists by March 31, and the winners soon after. We're awarding five $500 first prizes (plus a $1,000 grand prize), and Canon has donated five EOS Rebel Ti 35mm film camera kits and one EOS Elan 7e kit to the winners. We will publish the best photographs sometime this year. Thanks so much to everyone who participated.

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World View

Panama offers an ideal vantage point for scientists to see the big picture of life on earth

IN JUST TWO ACRES of a tropical forest, there can be as many species of trees as in all of the continental United States. In fact, the forests and coral reefs of the tropics are the world's most biologically diverse ecosystems. And because much of that diversity is still undescribed, and the contribution various species make to the stability of their ecosystems is still unexplained, the scientists at the Smithsonian Tropical Research Institute (STRI) in Panama won't be relaxing any time soon. Nor is theirs a local mission, despite the seeming limitation of "tropical." The knowledge they acquire studying marine and terrestrial life leaps the bounds of latitudes and advances our understanding of conditions that sustain life on a planetary scale. As an example, research on the capacity of rain forests to store carbon dioxide, and thereby mitigate the increasing levels of that gas in the atmosphere, is essential to the current debate about global climate change.

Smithsonian scientists arrived in Panama early in the 20th century, when biologists were needed to study insects carrying diseases that endangered workers building the canal. (See "Panama Turns 100," p. 44.) Because Panama happens to be ideally suited to the study of environmental stability and change, our scientists have been there ever since. The landmasses that are now North and South America floated free of each other for 65 million years. A mere three million years ago, the Isthmus of Panama rose from the oceans to form a land bridge between the continents. Once the bridge was in place, fauna and flora crossed from one to the other, to flourish or to die in their new homes.

Thanks to evolution, then, both geological and biological, Panama is rich in environments and species. Its landscape is marked by islands, coastal zones, mountain ranges, rain forests, and high-altitude elfin forests. Though separated by no more than the thin strip of the isthmus, the Atlantic and Pacific coasts of the country are radically different environments for marine life. More important, the known (and geologically recent) time of separation of organisms in the two oceans permits STRI researchers to ask—and answer—fundamental questions: How quickly do organisms evolve away from one another to become separate species? Do molecules of different organisms evolve at similar rates? If Pacific and Atlantic organisms were to come in contact once again, perhaps through a saltwater sea-level canal, would genetic changes keep them from interbreeding? And what aspects of the physical and biological environment drive those genetic changes in different groups?

STRI is now the world's largest and most innovative facility for the comprehensive study of tropical environments, with ten sites on the isthmus, a staff of more than 300, and as many as 500 scientists from around the world visiting in a typical year. The institute's programs of research and discovery radiate outward far beyond the lush locales of Panama, and theories to which evidence gathered on the isthmus gives rise are tested at other tropical sites in Latin America, Asia and Africa. Thus does the new knowledge gain legitimacy and force.

Cranes put the canopy within reach.

Construction cranes are not necessarily a welcome sight in a rain forest. But more than a decade ago, a STRI scientist realized that the machines might provide unprecedented access to one of earth's unexplored frontiers: the forest canopy, the vast exposed laboratory at the tops of trees where biosphere meets atmosphere and where so many new species have lately been discovered. To STRI scientists pursuing their investigation of the once-inaccessible zone from a gondola 100 feet off the ground, the terrestrial horizon may seem within reach. But a more important horizon, the boundary to their great progressive inquiry, recedes even as their knowledge advances. And to the benefit of us all, it draws them on.

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*Individual responses to ARICEPT® can be different – people may get better, stay the same or not get better.

ONCE-A-DAY

ARICEPT® (donepezil HCl) 5-MG AND 10-MG TABLETS

STRENGTH IN THE FACE OF ALZHEIMER'S™

ARICEPT® (Donepezil Hydrochloride Tablets)

Brief Summary—see package insert for full prescribing information. **INDICATIONS AND USAGE** ARICEPT® is indicated for the treatment of mild to moderate dementia of the Alzheimer's type. **CONTRAINDICATIONS** ARICEPT® is contraindicated in patients with known hypersensitivity to donepezil hydrochloride or to piperidine derivatives. **WARNINGS** ***Anesthesia:*** ARICEPT®, as a cholinesterase inhibitor, is likely to exaggerate succinylcholine-type muscle relaxation during anesthesia. ***Cardiovascular Conditions:*** Because of their pharmacological action, cholinesterase inhibitors may have vagotonic effects on the sinoatrial and atrioventricular nodes. This effect may manifest as bradycardia or heart block in patients both with and without known underlying cardiac conduction abnormalities. Syncopal episodes have been reported in association with the use of ARICEPT®. ***Gastrointestinal Conditions:*** Through their primary action, cholinesterase inhibitors may be expected to increase gastric acid secretion due to increased cholinergic activity. Therefore, patients should be monitored closely for symptoms of active or occult gastrointestinal bleeding, especially those at increased risk for developing ulcers, e.g., those with a history of ulcer disease or those receiving concurrent nonsteroidal anti-inflammatory drugs (NSAIDS). Clinical studies of ARICEPT® have shown no increase, relative to placebo, in the incidence of either peptic ulcer disease or gastrointestinal bleeding. ARICEPT®, as a predictable consequence of its pharmacological properties, has been shown to produce diarrhea, nausea and vomiting. These effects, when they occur, appear more frequently with the 10 mg/day dose than with the 5 mg/day dose. In most cases, these effects have been mild and transient, sometimes lasting one to three weeks, and have resolved during continued use of ARICEPT®. ***Genitourinary:*** Although not observed in clinical trials of ARICEPT®, cholinomimetics may cause bladder outflow obstruction. ***Neurological Conditions:*** Seizures: Cholinomimetics are believed to have some potential to cause generalized convulsions. However, seizure activity also may be a manifestation of Alzheimer's Disease. ***Pulmonary Conditions:*** Because of their cholinomimetic actions, cholinesterase inhibitors should be prescribed with care to patients with a history of asthma or obstructive pulmonary disease. **PRECAUTIONS Drug-Drug Interactions** ***Drugs Highly Bound to Plasma Proteins:*** Drug displacement studies have been performed *in vitro* between this highly bound drug (96%) and other drugs such as furosemide, digoxin, and warfarin. ARICEPT® at concentrations of 0.3-10 µg/mL did not affect the binding of furosemide (5 µg/mL), digoxin (2 ng/mL), and warfarin (3 µg/mL) to human albumin. Similarly, the binding of ARICEPT® to human albumin was not affected by furosemide, digoxin, and warfarin. ***Effect of ARICEPT® on the Metabolism of Other Drugs:*** No *in vivo* clinical trials have investigated the effect of ARICEPT® on the clearance of drugs metabolized by CYP 3A4 (e.g. cisapride, terfenadine) or by CYP 2D6 (e.g. imipramine). However, *in vitro* studies show a low rate of binding to these enzymes (mean K_i about 50-130 µM), that, given the therapeutic plasma concentrations of donepezil (164 nM), indicates little likelihood of interference. Whether ARICEPT® has any potential for enzyme induction is not known. ***Effect of Other Drugs on the Metabolism of ARICEPT®:*** Ketoconazole and quinidine, inhibitors of CYP450, 3A4 and 2D6, respectively, inhibit donepezil metabolism *in vitro*. Whether there is a clinical effect of these inhibitors is not known. Inducers of CYP 2D6 and CYP 3A4 (e.g., phenytoin, carbamazepine, dexamethasone, rifampin, and phenobarbital) could increase the rate of elimination of ARICEPT®. ***Use with Anticholinergics:*** Because of their mechanism of action, cholinesterase inhibitors have the potential to interfere with the activity of anticholinergic medications. ***Use with Cholinomimetics and Other Cholinesterase Inhibitors:*** A synergistic effect may be expected when cholinesterase inhibitors are given concurrently with succinylcholine, similar neuromuscular blocking agents or cholinergic agonists such as bethanechol. **Carcinogenesis, Mutagenesis, Impairment of Fertility** Carcinogenicity studies of donepezil have not been completed. Donepezil was not mutagenic in the Ames reverse mutation assay in bacteria. In the chromosome aberration test in cultures of Chinese hamster lung (CHL) cells, some clastogenic effects were observed. Donepezil was not clastogenic in the *in vivo* mouse micronucleus test. Donepezil had no effect on fertility in rats at doses up to 10 mg/kg/day (approximately 8 times the maximum recommended human dose on a mg/m² basis). **Pregnancy** ***Pregnancy Category C:*** Teratology studies conducted in pregnant rats at doses up to 16 mg/kg/day (approximately 13 times the maximum recommended human dose on a mg/m² basis) and in pregnant rabbits at doses up to 10 mg/kg/day (approximately 16 times the maximum recommended human dose on a mg/m² basis) did not disclose any evidence for a teratogenic potential of donepezil. However, in a study in which pregnant rats were given up to 10 mg/kg/day (approximately 8 times the maximum recommended human dose on a mg/m² basis) from day 17 of gestation through day 20 postpartum, there was a slight increase in still births and a slight decrease in pup survival through day 4 postpartum at this dose; the next lower dose tested was 3 mg/kg/day. There are no adequate or well-controlled studies in pregnant women. ARICEPT® should be used during pregnancy only if the potential benefit justifies the potential risk to the fetus. **Nursing Mothers** It is not known whether donepezil is excreted in human breast milk. ARICEPT® has no indication for use in nursing mothers. **Pediatric Use** There are no adequate and well-controlled trials to document the safety and efficacy of ARICEPT® in any illness occurring in children. **ADVERSE REACTIONS Adverse Events Leading to Discontinuation** The rates of discontinuation from controlled clinical trials of ARICEPT® due to adverse events for the ARICEPT® 5 mg/day treatment groups were comparable to those of placebo-treatment groups at approximately 5%. The rate of discontinuation of patients who received 7-day escalations from 5 mg/day to 10 mg/day, was higher at 13%. The most common adverse events leading to discontinuation, defined as those occurring in at least 2% of patients and at twice the incidence seen in placebo patients, are shown in Table 1.

Table 1. Most Frequent Adverse Events Leading to Withdrawal from Controlled Clinical Trials by Dose Group

Dose Group	Placebo	5 mg/day ARICEPT®	10 mg/day ARICEPT®
Patients Randomized	355	350	315
Event/%Discontinuing			
Nausea	1%	1%	3%
Diarrhea	0%	<1%	3%
Vomiting	<1%	<1%	2%

Most Frequent Adverse Clinical Events Seen in Association with the Use of ARICEPT® The most common adverse events, defined as those occurring at a frequency of at least 5% in patients receiving 10 mg/day and twice the placebo rate, are largely predicted by ARICEPT®'s cholinomimetic effects. These include nausea, diarrhea, insomnia, vomiting, muscle cramp, fatigue and anorexia. These adverse events were often of mild intensity and transient, resolving during continued ARICEPT® treatment without the need for dose modification. There is evidence to suggest that the frequency of these common adverse events may be affected by the rate of titration. An open-label study was conducted with 269 patients who received placebo in the 15- and 30-week studies. These patients were titrated to a dose of 10 mg/day over a 6-week period. The rates of common adverse events were lower than those seen in patients titrated to 10 mg/day over one week in the controlled clinical trials and were comparable to those seen in patients on 5 mg/day. See Table 2 for a comparison of the most common adverse events following one and six week titration regimens.

Table 2. Comparison of Rates of Adverse Events in Patients Titrated to 10 mg/day Over 1 and 6 Weeks

	No titration		One-week titration	Six-week titration
Adverse Event	**Placebo (n=315)**	**5 mg/day (n=311)**	**10 mg/day (n=315)**	**10 mg/day (n=269)**
Nausea	6%	5%	19%	6%
Diarrhea	5%	8%	15%	9%
Insomnia	6%	6%	14%	6%
Fatigue	3%	4%	8%	3%
Vomiting	3%	3%	8%	5%
Muscle cramps	2%	6%	8%	3%
Anorexia	2%	3%	7%	3%

Adverse Events Reported in Controlled Trials The events cited reflect experience gained under closely monitored conditions of clinical trials in a highly selected patient population. In actual clinical practice or in other clinical trials, these frequency estimates may not apply, as the conditions of use, reporting behavior, and the kinds of patients treated may differ. Table 3 lists treatment emergent signs and symptoms that were reported in at least 2% of patients in placebo-controlled trials who received ARICEPT® and for which the rate of occurrence was greater for ARICEPT® assigned than placebo assigned patients. In general, adverse events occurred more frequently in female patients and with advancing age.

Table 3. Adverse Events Reported in Controlled Clinical Trials in at Least 2% of Patients Receiving ARICEPT® (donepezil HCl) and at a Higher Frequency than Placebo-treated Patients

Body System/Adverse Event	Placebo (n=355)	ARICEPT® (n=747)
Percent of Patients with any Adverse Event	**72**	**74**
Body as a Whole		
Headache	9	10
Pain, various locations	8	9
Accident	6	7
Fatigue	3	5
Cardiovascular System		
Syncope	1	2
Digestive System		
Nausea	6	11
Diarrhea	5	10
Vomiting	3	5
Anorexia	2	4
Hemic and Lymphatic System		
Ecchymosis	3	4
Metabolic and Nutritional Systems		
Weight Decrease	1	3
Musculoskeletal System		
Muscle Cramps	2	6
Arthritis	1	2
Nervous System		
Insomnia	6	9
Dizziness	6	8
Depression	<1	3
Abnormal Dreams	0	3
Somnolence	<1	2
Urogenital System		
Frequent Urination	1	2

Other Adverse Events Observed During Clinical Trials ARICEPT® has been administered to over 1700 individuals during clinical trials worldwide. Approximately 1200 of these patients have been treated for at least 3 months and more than 1000 patients have been treated for at least 6 months. Controlled and uncontrolled trials in the United States included approximately 900 patients. In regards to the highest dose of 10 mg/day, this population includes 650 patients treated for 3 months, 475 patients treated for 6 months and 116 patients treated for over 1 year. The range of patient exposure is from 1 to 1214 days. Treatment emergent signs and symptoms that occurred during 3 controlled clinical trials and two open-label trials in the United States were recorded as adverse events by the clinical investigators using terminology of their own choosing. To provide an overall estimate of the proportion of individuals having similar types of events, the events were grouped into a smaller number of standardized categories using a modified COSTART dictionary and event frequencies were calculated across all studies. These categories are used in the listing below. The frequencies represent the proportion of 900 patients from these trials who experienced that event while receiving ARICEPT®. All adverse events occurring at least twice are included, except for those already listed in Tables 2 or 3, COSTART terms too general to be informative, or events less likely to be drug caused. Events are classified by body system and listed using the following definitions: *frequent adverse events*—those occurring in at least 1/100 patients; *infrequent adverse events*—those occurring in 1/100 to 1/1000 patients. These adverse events are not necessarily related to ARICEPT® treatment and in most cases were observed at a similar frequency in placebo-treated patients in the controlled studies. No important additional adverse events were seen in studies conducted outside the United States. **Body as a Whole:** *Frequent:* influenza, chest pain, toothache; *Infrequent:* fever, edema face, periorbital edema, hernia hiatal, abscess, cellulitis, chills, generalized coldness, head fullness, listlessness. **Cardiovascular System:** *Frequent:* hypertension, vasodilation, atrial fibrillation, hot flashes, hypotension; *Infrequent:* angina pectoris, postural hypotension, myocardial infarction, AV block (first degree), congestive heart failure, arteritis, bradycardia, peripheral vascular disease, supraventricular tachycardia, deep vein thrombosis. **Digestive System:** *Frequent:* fecal incontinence, gastrointestinal bleeding, bloating, epigastric pain; *Infrequent:* eructation, gingivitis, increased appetite, flatulence, periodontal abscess, cholelithiasis, diverticulitis, drooling, dry mouth, fever sore, gastritis, irritable colon, tongue edema, epigastric distress, gastroenteritis, increased transaminases, hemorrhoids, ileus, increased thirst, jaundice, melena, polydipsia, duodenal ulcer, stomach ulcer. **Endocrine System:** *Infrequent:* diabetes mellitus, goiter. **Hemic and Lymphatic System:** *Infrequent:* anemia, thrombocythemia, thrombocytopenia, eosinophilia, erythrocytopenia. **Metabolic and Nutritional Disorders:** *Frequent:* dehydration; *Infrequent:* gout, hypokalemia, increased creatine kinase, hyperglycemia, weight increase, increased lactate dehydrogenase. **Musculoskeletal System:** *Frequent:* bone fracture; *Infrequent:* muscle weakness, muscle fasciculation. **Nervous System:** *Frequent:* delusions, tremor, irritability, paresthesia, aggression, vertigo, ataxia, increased libido, restlessness, abnormal crying, nervousness, aphasia; *Infrequent:* cerebrovascular accident, intracranial hemorrhage, transient ischemic attack, emotional lability, neuralgia, coldness (localized), muscle spasm, dysphoria, gait abnormality, hypertonia, hypokinesia, neurodermatitis, numbness (localized), paranoia, dysarthria, dysphasia, hostility, decreased libido, melancholia, emotional withdrawal, nystagmus, pacing. **Respiratory System:** *Frequent:* dyspnea, sore throat, bronchitis; *Infrequent:* epistaxis, post nasal drip, pneumonia, hyperventilation, pulmonary congestion, wheezing, hypoxia, pharyngitis, pleurisy, pulmonary collapse, sleep apnea, snoring. **Skin and Appendages:** *Frequent:* pruritus, diaphoresis, urticaria; *Infrequent:* dermatitis, erythema, skin discoloration, hyperkeratosis, alopecia, fungal dermatitis, herpes zoster, hirsutism, skin striae, night sweats, skin ulcer. **Special Senses:** *Frequent:* cataract, eye irritation, vision blurred; *Infrequent:* dry eyes, glaucoma, earache, tinnitus, blepharitis, decreased hearing, retinal hemorrhage, otitis externa, otitis media, bad taste, conjunctival hemorrhage, ear buzzing, motion sickness, spots before eyes. **Urogenital System:** *Frequent:* urinary incontinence, nocturia; *Infrequent:* dysuria, hematuria, urinary urgency, metrorrhagia, cystitis, enuresis, prostate hypertrophy, pyelonephritis, inability to empty bladder, breast fibroadenosis, fibrocystic breast, mastitis, pyuria, renal failure, vaginitis. **Postintroduction Reports** Voluntary reports of adverse events temporally associated with ARICEPT® that have been received since market introduction that are not listed above, and that there is inadequate data to determine the causal relationship with the drug include the following: abdominal pain, agitation, cholecystitis, confusion, convulsions, hallucinations, heart block (all types), hemolytic anemia, hepatitis, hyponatremia, neuroleptic malignant syndrome, pancreatitis, and rash. **OVERDOSAGE Because strategies for the management of overdose are continually evolving, it is advisable to contact a Poison Control Center to determine the latest recommendations for the management of an overdose of any drug.** As in any case of overdose, general supportive measures should be utilized. Overdosage with cholinesterase inhibitors can result in cholinergic crisis characterized by severe nausea, vomiting, salivation, sweating, bradycardia, hypotension, respiratory depression, collapse and convulsions. Increasing muscle weakness is a possibility and may result in death if respiratory muscles are involved. Tertiary anticholinergics such as atropine may be used as an antidote for ARICEPT® overdosage. Intravenous atropine sulfate titrated to effect is recommended: an initial dose of 1.0 to 2.0 mg IV with subsequent doses based upon clinical response. Atypical responses in blood pressure and heart rate have been reported with other cholinomimetics when co-administered with quaternary anticholinergics such as glycopyrrolate. It is not known whether ARICEPT® and/or its metabolites can be removed by dialysis (hemodialysis, peritoneal dialysis, or hemofiltration). Dose-related signs of toxicity in animals included reduced spontaneous movement, prone position, staggering gait, lacrimation, clonic convulsions, depressed respiration, salivation, miosis, tremors, fasciculation and lower body surface temperature. **DOSAGE AND ADMINISTRATION** The dosages of ARICEPT® shown to be effective in controlled clinical trials are 5 mg and 10 mg administered once per day. The higher dose of 10 mg did not provide a statistically significantly greater clinical benefit than 5 mg. There is a suggestion, however, based upon order of group mean scores and dose trend analyses of data from these clinical trials, that a daily dose of 10 mg of ARICEPT® might provide additional benefit for some patients. Accordingly, whether or not to employ a dose of 10 mg is a matter of prescriber and patient preference. Evidence from the controlled trials indicates that the 10 mg dose, with a one week titration, is likely to be associated with a higher incidence of cholinergic adverse events than the 5 mg dose. In open label trials using a 6 week titration, the frequency of these same adverse events was similar between the 5 mg and 10 mg dose groups. Therefore, because steady state is not achieved for 15 days and because the incidence of untoward effects may be influenced by the rate of dose escalation, treatment with a dose of 10 mg should not be contemplated until patients have been on a daily dose of 5 mg for 4 to 6 weeks. ARICEPT® should be taken in the evening, just prior to retiring, and may be taken with or without food.

Eisai Inc. Teaneck, NJ 07666 · Pfizer U.S. Pharmaceuticals New York, NY 10017

200177 Revised December 2000

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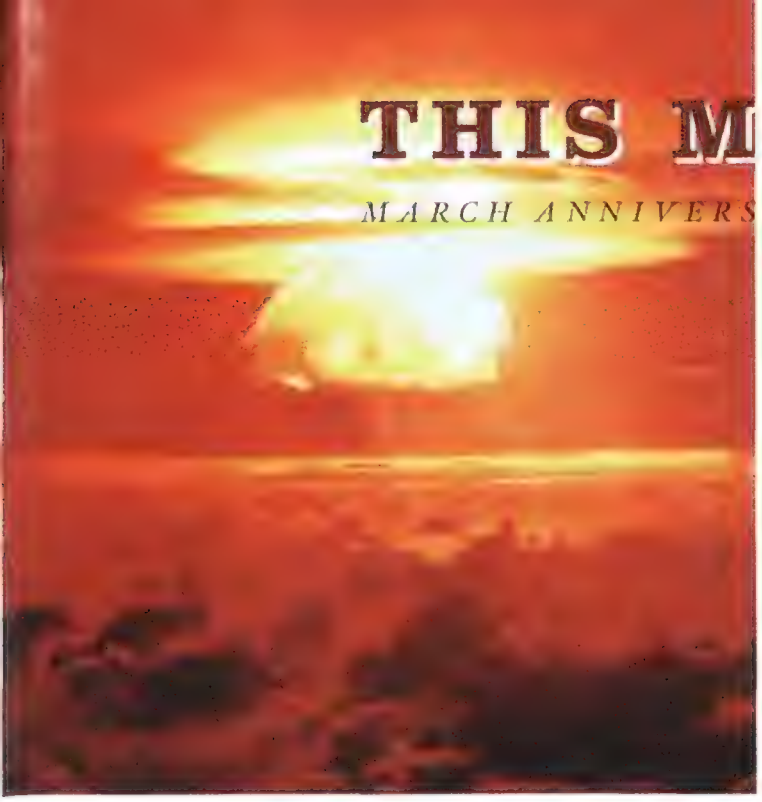
THIS MONTH IN HISTORY

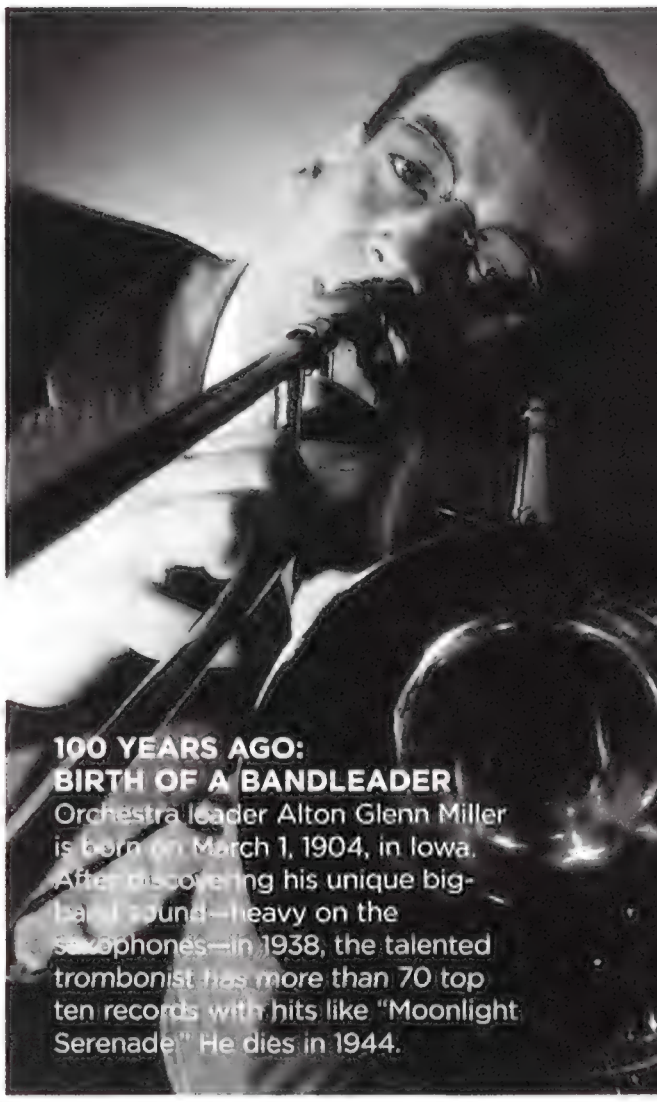
MARCH ANNIVERSARIES—MOMENTOUS OR MERELY MEMORABLE



50 YEARS AGO: BIG BANG
On March 1, 1954, the United States explodes a 15-megaton hydrogen bomb over Bikini Atoll in the largest U.S. thermonuclear test ever. The first of six bombs in a series known as Operation Castle, the blast, called Bravo, sends up a fireball 100 kilometers in diameter. "It looked like . . . a brain of some madman," recalls an eyewitness. Weather conditions mean fallout lands on a fishing boat, killing one person, and on Marshall Islands inhabitants, sickening hundreds more. The U.S. ceases all nuclear testing in 1992.

50 YEARS AGO: IN LIVING COLOR
In March 1954, RCA rolls out the CT-100, the first mass-produced color television in America. All electronic, the set costs $1,000, and receives black-and-white as well as color broadcasts. A good thing—only 68 hours of color programs are shown that year.

250 YEARS AGO: CHAIRMAN OF THE BOARD
Thomas Chippendale, 36, publishes *The Gentleman and Cabinet-Maker's Director*, a book of his furniture designs, in London in 1754. Immediately popular in England and the Colonies, his patterns unseat earlier designers and lend his name to pieces still made today.



100 YEARS AGO: BIRTH OF A BANDLEADER
Orchestra leader Alton Glenn Miller is born on March 1, 1904, in Iowa. After discovering his unique big-band sound—heavy on the saxophones—in 1938, the talented trombonist has more than 70 top ten records with hits like "Moonlight Serenade." He dies in 1944.

125 YEARS AGO: UNBAR THE DOOR
Attorney and activist Belva Ann Lockwood is the first woman admitted to the Supreme Court bar, on March 3, 1879. After winning her four-year battle with Congress for a woman's right to argue before the high court, Lockwood, known around the capital for her habit of riding a tricycle, will be the first woman to run for president, in 1884.

175 YEARS AGO: THE PEOPLE'S PRESIDENT
A president of firsts, Andrew "Old Hickory" Jackson is inaugurated on March 4, 1829. The first president from the West, the first born in poverty, the first with popular, rather than party, backing, he champions a new democracy, starting by inviting the public to the White House for an inaugural party. ○

ALISON MCLEAN

Readers respond to the January issue:

BLESSING COUNTED

MY HUSBAND HAS BEEN laid off from his job, and I was feeling unhappy that he's still unemployed. Then I read "Coming to America." Thank you for reminding me that one of my biggest blessings is to have been born in this country, and instead of having to escape oppression and persecution, my husband is only looking for the next high-paying job with good benefits.

KIMBERLY MOMBERGER
NEWNAN, GEORGIA

INUIT WAYS

I WAS ASTOUNDED to read in "Top Dogs" that the French Arctic explorer Jean Malaurie thought the Inuit's relationship to their dogs was "as close as a marriage." Since the article also states that the Inuit have neither the "inclination nor the means to care for badly injured or sick canines," does this mean they shoot their sick or injured spouses or allow their babies to fall onto the ice and be devoured by a sled team?

ROSEMARIE TRUDEAU
SANDPOINT, IDAHO

VIEQUES REVISITED

WE WERE SURPRISED that "Vieques on the Verge" failed to mention the extensive studies on potential health risks on Vieques conducted by the Agency for Toxic Substances and Disease Registry (ATSDR) at the request of an island resident. ATSDR, part of the Centers for Disease Control and Prevention, investigated conditions at Vieques and found no evidence that local residents have been exposed to harmful levels of chemicals resulting from Navy training activities.

DONALD R. SCHREGARDUS
DEPUTY ASSISTANT SECRETARY OF THE NAVY

We had the ATSDR's studies and others in mind when we reported that the "Navy disputes any link between its presence and health problems on the island." In fact, we wanted to more fully characterize the Navy's stance on the issue, but repeated requests to interview a Navy official were turned down, and we were instead referred to a Navy statement made before the ATSDR studies were released. —Ed.

FAIR TRADE?

DAVID DEVOSS' "Divided Loyalties," about British Tories who fled to Canada during the American Revolution, mentions the gilded coat of arms now hanging in Trinity Church in Saint John, New Brunswick, that originally graced the Council Chamber of the Old State House in Boston. A story persists about an attempt some years ago to have the Royal Shield of Arms, removed by Tory Edward Winslow, returned to Boston. When a request was made to give it back "to its rightful owner," the response was: "We will return the Royal Arms to you when you return Boston to us!" I doubt that Boston will ever see these arms again.

EUGENE A. FORTINE
SAN LEANDRO, CALIFORNIA

EAR OF THE BEHOLDER

I GREW UP IN Puerto Rico, where the coqui frog ("Sleepless in Hawaii") is a sort of national symbol, a native beloved as the source of one of the island's most ubiquitous sounds, and I had to laugh at the tiny frog being presented as some sort of a threat. Helen Geiger's complaints remind me of city dwellers who move to the suburbs, where they swallow up farmland and force the few remaining farmers to get rid of their chickens because they can't stand the cock-a-doodle-dooing. Maybe the solution for Mrs. Geiger would be to move to an apartment high above the frogs.

LUIS TORRES
SAN ANTONIO, TEXAS

PROMOTING CLARK

"LOOKING FOR A FEW Good Men" correctly states that William Clark remained a lieutenant despite President Jefferson's promise that he would be made a captain. As co-chair of the Lewis and Clark Bicentennial Congressional Caucus and as a former Army officer, I introduced legislation that was signed into law in 2000 to posthumously award Clark his long-overdue rank of captain. Lewis and Clark have now been properly ranked as equals. But American taxpayers can be assured that no back pay was authorized for Clark's relatives.

DOUG BEREUTER
U.S. REPRESENTATIVE, NEBRASKA-1ST DISTRICT

ALSO COURAGEOUS

I HAVE ALWAYS THOUGHT there was another anonymous hero ("Profile in Courage") involved when the unknown protester faced down a Chinese tank column in Tiananmen Square. The tank driver who hesitated, then chose not to crush his confronter, probably risked punishment or death from superiors.

DONALD NEAL
ANCHORAGE, ALASKA

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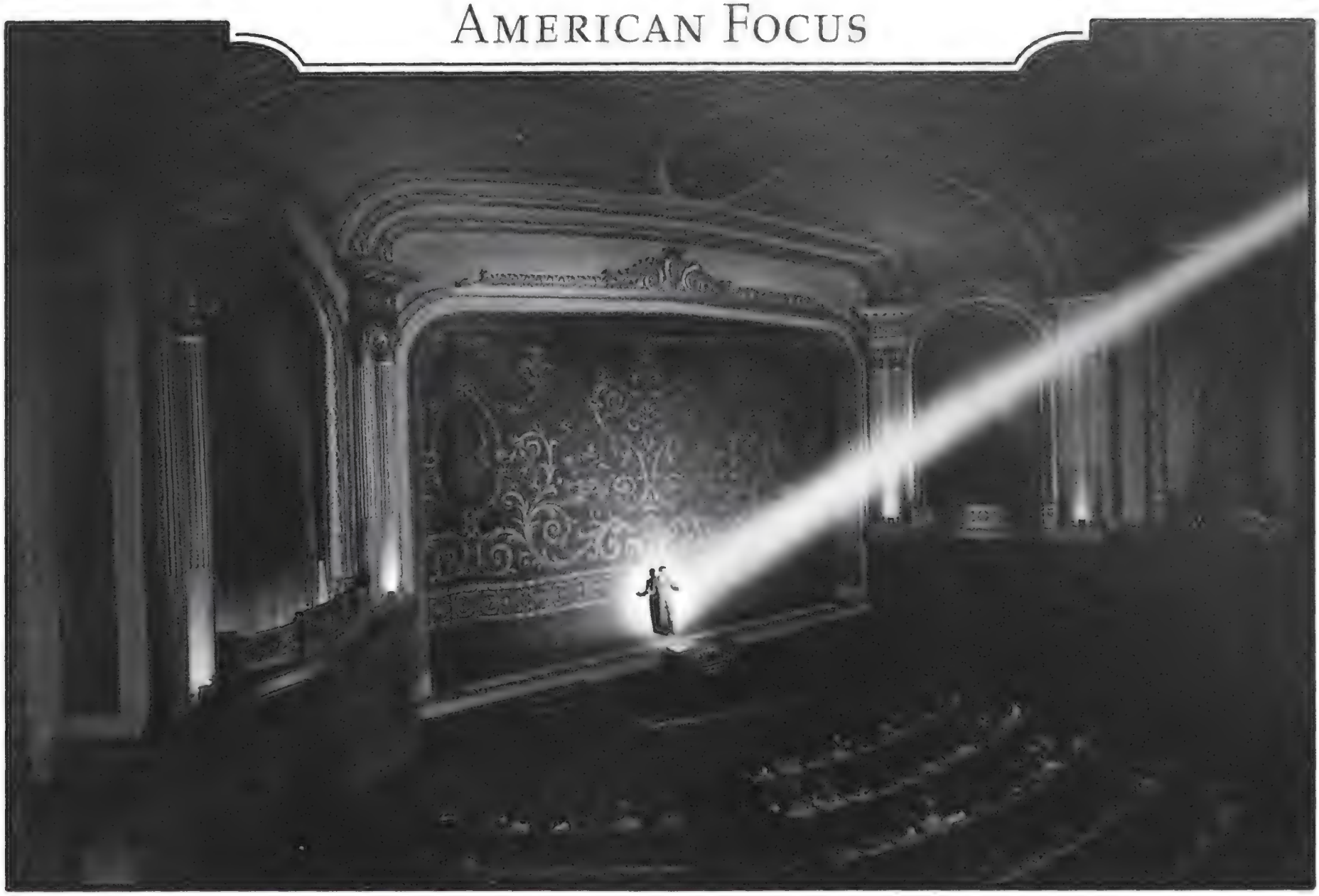
American Focus



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2004
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Private Eye

Noted for her sensitive photojournalism in postwar magazines, Esther Bubley is back in vogue – BY BEVERLY W. BRANNAN

ESTHER BUBLEY was among the best-known photographers of her time, and for three decades blazed trails, especially for women, with her work for the government, corporations and magazines such as *Life*, *Look* and *Ladies' Home Journal.* Though she photographed celebrities—Albert Einstein, Marianne Moore, Charlie Parker—her talent was for ordinary life. "Put me down with people," she said, "and it's just overwhelming." Bubley's photographs of Americans in the 1940s and 1950s—sailors on liberty, bus riders, boardinghouse residents, hospital patients, teenagers at a birthday party—are so plain and yet so evocative they have long been included in museum exhibitions that try to convey something of

Bubley's work (a birthday party in Westport, Connecticut, for *Woman's Day* in 1957) "achieved incredible intimacy," one editor said.

One scholar says Bubley played a role in how women were portrayed in film noir.

Bubley (below, c. 1960) made wartime photos in Washington, D.C. (1943) on her own.

the nation's character in those days. Her 1947 color photograph of a man in a fedora standing on a train platform in New York City, a painterly picture of long shadows and sooty red bricks (see page 8), calls to mind the distracted loneliness of an Edward Hopper canvas. The movie scholar Paula Rabinowitz even theorizes that Bubley's photographs of women working in offices and factories in World War II contributed to a staple of the film noir genre—the strong-willed independent female freed from household drudgery by the war effort.

Since Bubley's death from cancer at age 77 in 1998, her reputation has only grown. The Library of Congress selected Bubley's work to inaugurate a Web site, launched last month, about female photojournalists (loc.gov/rr/print). Jean Bubley, a computer systems consultant, runs a Web site highlighting her aunt's career, estherbubley.com. Major exhibitions of her work were held in Pittsburgh last year and in New York City in 2001, and a book of her journalism is scheduled for publication next year.

Born in Phillips, Wisconsin, in 1921 to Jewish immigrants—her father was from Russia, her mother from Lithuania—Bubley started making and selling photographs as a teenager. After college in Minnesota, she went to Washington, D.C. and New York City seeking work as a photographer, but found none. Still, she showed her pictures to Edward Steichen, future photography curator at the Museum of Modern Art, who encouraged her (and would later exhibit her work). In 1942, she landed in the nation's capital, shooting microfilm of rare books at the National Archives and, later, printing photographs at the Office of War Information, successor to the historical section of the Farm Security Administration, which had supported such celebrated documentary photographers as Walker Evans, Dorothea Lange and Gordon Parks. In her off hours, Bubley took pictures of single working women. Her break came in 1943, when the photography office's director, Roy Stryker, sent her on a six-week cross-country bus trip to capture a nation at war. Her late 1940s photographs of Texas oil towns for Standard Oil (New Jersey), a project also overseen by Stryker, are postwar landmarks.

Bubley was a successful freelancer and, in 1954, the first woman awarded top prize in *Photography* magazine's competition for international work, for a photograph of women in Morocco made for UNICEF. She produced a dozen photo essays between 1948 and 1960 on "How America Lives" for *Ladies' Home Journal*. As the magazine's editor, John G. Morris, put it in 1998, "Bubley had the ability to make people forget she was even around; her pictures achieved incredible intimacy."

A private woman, Bubley, whose marriage in 1948 to Ed Locke, an assistant to Stryker, lasted barely two years, spent her later decades in New York City, making pictures of her Dalmatians and of Central Park, among other things. She did not have fancy theories about her calling. At age 31, she made an entry in a journal that caught the essence of her approach—direct, unadorned, essentially American and deceptively simple: "I am quite humble & happy to be one of those people who work because they love their work & take pride in doing it as best they can." ○

BEVERLY W. BRANNAN is a curator of photography at the Library of Congress.

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INDICATIONS AND USAGE
Seasonal Allergic Rhinitis

Chronic Idiopathic Urticaria

CONTRAINDICATIONS

PRECAUTIONS
Drug Interaction with Erythromycin and Ketoconazole

Effects on steady-state fexofenadine hydrochloride pharmacokinetics after 7 days of co-administration with fexofenadine hydrochloride 120 mg every 12 hours (two times the recommended twice daily dose) in normal volunteers (n=24)

Drug Interactions with Antacids

Carcinogenesis, Mutagenesis, Impairment of Fertility

Pregnancy
Teratogenic Effects: Category C.

Nonteratogenic Effects.

Nursing Mothers

Pediatric Use

Geriatric Use

ADVERSE REACTIONS
Seasonal Allergic Rhinitis
Adults.

Table 1
Adverse experiences in patients ages 12 years and older reported in placebo controlled seasonal allergic rhinitis clinical trials in the United States
Twice daily dosing with fexofenadine capsules at rates of greater than 1%

Once daily dosing with fexofenadine hydrochloride tablets at rates of greater than 2%

Pediatric.

Table 2
Adverse experiences reported in placebo-controlled seasonal allergic rhinitis studies in pediatric patients ages 6 to 11 in the United States and Canada at rates of greater than 2%

Chronic Idiopathic Urticaria

Table 3
Adverse experiences reported in patients 12 years and older in placebo-controlled chronic idiopathic urticaria studies in the United States and Canada at rates of greater than 2%

OVERDOSAGE

DOSAGE AND ADMINISTRATION
Seasonal Allergic Rhinitis
Adults and Children 12 Years and Older. The recommended dose of ALLEGRA is 60 mg
Children 6 to 11 Years.
Chronic Idiopathic Urticaria
Adults and Children 12 Years and Older.
Children 6 to 11 Years.

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www.sa-venues.com/game_lodges_nationwide_south_afr.htm

May 14 - 31
REYKJAVÍK ARTS FESTIVAL
Reykjavík, Iceland
http://artfest.is/index.asp

June 1 - 30
BERMUDA FITTED DINGHY RACES
St. George's Harbour, Bermuda
441-236-4411 or www.rhadc.com

June 24
INTI RAYMI FESTIVAL
Cusco, Peru
www.enjoyperu.com

July 4 - 15
RED CARPET *LORD OF THE RINGS* TOURS
North and South Islands, New Zealand
www.redcarpet-tours.com

July 6 - 14
FEAST OF SAN FERMIN
Pamplona, Spain
www.sanfermin.com or www.pamplona.net

FEATURED EVENTS

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[*Artie Shaw's clarinet* NATIONAL MUSEUM OF AMERICAN HISTORY]

Magic Wand

Clarinetist Artie Shaw's recordings recall the nostalgic power of the big-band sound – BY OWEN EDWARDS

PSYCHOLOGISTS TELL US that our sense of smell conjures up some of our deepest emotional memories. Take a deep whiff of baby powder and you might be transported about as far back as you can go. (You're hungry, you're cranky. . . better loosen your grip on that powder tin.) Our sense of hearing, however, must rank a close second as a time machine. In particular, it's the nature of music to flash us back to when and where we first heard a song or a fragment of a symphonic theme or, maddeningly, an inane sitcom theme. Melody and memory are constant companions. I was drawn to classical music not by my mother's playing of Chopin, but by the radio adventures of the Lone Ranger and the show's theme tunes—borrowed from Rossini and Liszt. I can never hear the overture to William Tell or *Les Preludes* without picturing myself sitting on a deep, striped sofa in my parents' house in Westfield, New Jersey, listening intently to a radio twice my size.

Shaw (c. 1950) played professionally from the time he left home at age 15.

For many people of a certain age, the sound of classic swing music is the mnemonic key to the past. The famous bands arose at a time when entertainment was an integral element in America's emergence from hard times, as well as a salve for increasing anxiety about the distant rumble of war. Each of the top ensembles played songs that both defined the band and the times, hits such as Glenn Miller's "String of Pearls," Count Basie's "One O'Clock Jump," and Benny Goodman's "Sing, Sing, Sing." When Goodman's band, featuring Teddy Wilson, Lionel Hampton and Gene Krupa, brought jazz to Carnegie Hall in 1938, swing was king. For many fans, young jitterbuggers then who now look back fondly on the big beat and the big brass of swing, no bandleader better epitomizes the era than Artie Shaw, and no song opens the door to that dramatic, romantic time more evocatively than "Begin the Beguine."

In 1935, Cole Porter wrote the song for a Broadway show called *Jubilee*. The musical died young, but "Begin the Beguine" lived on, in no small measure because of Artie Shaw's brilliant rendition. Fittingly, the song lyric is itself about memory—"When they begin the beguine / It brings back the sound of music so tender . . . "—and few who listened to Shaw's 1938 recording of the tune can forget the splendor of his clarinet's melodic line. That

clarinet, a Selmer, is one of two that Shaw has donated to the Smithsonian. (The other is a Buffet that the bandleader used with his quintet, the Gramercy 5; the Selmer, Shaw says, had more "shout" than the sweeter, woodier Buffet, making it better in front of a big band.) For romantic couples and jazz lovers before, during and long after World War II, these clarinets are nothing less than magic wands, and they join a collection of numinous instruments that includes Lionel Hampton's vibraphone, Dizzy Gillespie's trumpet and Tito Puente's timbales.

Shaw's band was well on the road to success by 1938, the year he recorded the Porter tune as an instrumental. The record sold more than a million copies—a tremendous number in those 78 r.p.m. days—and within a year or so the band, with the handsome, tuxedo-clad Shaw doing clarinet solos, was earning a reported $60,000 a week. Though today the 93-year-old Shaw describes "Begin the Beguine" merely as "a nice little tune from one of Cole Porter's very few flop shows," the power of his version turned it into the theme song of countless courtships.

Although the record was made the year I was born, it was such a standard in later years that I can still remember my feeling, every time I heard it as a teenager (in those pre-rock 'n' roll years), that this melody carried all the magic and mystery of what it meant to be a grown-up. I had *no* idea that a beguine was a rumba-like dance from the islands of Martinique and St. Lucia, nor the remotest notion of what "a night of tropical splendor" might comprise, but Shaw's playing struck the same responsive chord within me as it did within my parents.

The reaction must have been nearly universal, because the record became one of the biggest sellers of its era, and Shaw rose to such iconic status that, in the late 1930s, on the eve of World War II, *Time* magazine reported that the German public thought of America as "skyscrapers, Clark Gable, and Artie Shaw."

The big-band legend (in California last year at 93) describes his greatest hit, "Begin the Beguine," as "a nice little tune."

Shaw, a teenage saxophonist who switched to the clarinet, began playing professionally shortly after leaving his Connecticut home at the age of 15. A few years later he discovered two disparate geniuses—Igor Stravinsky and Louis Armstrong—and the influence of these two musical pioneers led him to play and compose classical music as well as swing and jazz. After Pearl Harbor, Shaw joined the Navy, formed a band, and played throughout the Pacific as MacArthur's island-hopping advances unfolded. In 1954, Shaw, still tremendously popular, retired from music—perhaps deciding he wanted to quit at the top of his game. He went on to become a nationally ranked marksman and expert fly fisherman. When asked recently if he still practiced on his clarinets, he said, "I haven't played them for 50 years."

Which, for anyone listening today to his rapturous versions of "Begin the Beguine," "Frenesi" and "Stardust," seems a shame. As Smithsonian curator John Hasse said at the donation ceremony for Shaw's clarinets, "His playing was virtuosic, lyrical and passionate. Gifted with a sensitivity to melody, Shaw was a master of melodic invention and paraphrase, as he created, on the spot, compositional perfection in his solos." The highest accolade for any artist is that his or her work cannot be imagined any other way; Shaw's solos, Hasse said, sounded "logical and inevitable."

Inevitably, Shaw was compared to the equally gifted clarinetist, Benny Goodman; the public, he says, perceived the two musicians as engaged in a kind of performers' duel. Yet he dismisses the idea of any such competition. "You have to have a sound that is yours," he says. "You're not in a footrace, after all."

Looking back on his brilliant career, Shaw tends not to make too much of his talent or his instruments. He even says, with casual heresy, that for the recording of "Stardust" he used a less expensive plastic reed. "The difference between players," he says, "is in the details. You're never completely happy with your playing. Sometimes you come close, but those occasions are very rare. I call myself an 80 percent loser."

Given the hundreds of thousands of lives Artie Shaw's music touched, that is far too modest an assessment. But even if it were true, could there be a more fabulous 20 percent? ○

Writer OWEN EDWARDS *is a freelancer who is based in San Francisco.*

Says Shaw: "You're never completely happy with your playing. Sometimes you come close, but those occasions are very rare."

Return of a Giant

A fully restored Vulcan—Birmingham, Alabama's 100-year-old statue—resumes its rightful place in town – BY JEFF BOOK

IT SOUNDS LIKE THE PLOT of a three-hankie biopic: a ruggedly handsome fellow comes out of nowhere, becomes the top draw at a world's fair, then goes to pieces and is reduced to working as a carnival huckster. In a stunning comeback, he stars in a one-man show, until a lethal ailment threatens his very existence and his fans rally to save him.

That's the story of Vulcan, the iconic Iron Man of Birmingham, Alabama. Though little known outside the region, the 55-foot-tall figure is the largest cast-iron statue in the world and the largest statue of any kind in the United States after the Statue of Liberty. Now, after a few years in rehab, the big guy is back on top, just in time to celebrate his 100th birthday. A gala is planned for June, but Vulcan's refurbished viewing platform recently opened to the public.

The $14.5 million restoration of the statue and surrounding Vulcan Park was paid for by contributions large and small, including one from Save Outdoor Sculpture, a program cosponsored by the Smithsonian Institution.

Founded in 1871, Birmingham grew rapidly into a major iron-making center. To trumpet this fact at the 1904 St. Louis World's Fair, local business leaders decided on a surefire attraction—a colossal iron statue of Vulcan, Roman god of the forge. In its marriage of art and commerce, its build-it-and-they'll-come confidence, the project was a classic bit of American boosterism. Oversized and conspicuous, the figure would be a bravura feat for both the city and Giuseppe Moretti, the Italian-born sculptor who accepted the commission in November 1903—just five months before the fair's opening.

Moretti, a master of Beaux-Arts technique, had already produced a statue of Cornelius Vanderbilt (now at Vanderbilt University) and bronze statuary for Pittsburgh parks. The metal-mad Medicis of Birmingham's Commercial Club quickly approved his two-foot-tall clay model, the basis for an eight-foot-tall working one that followed. It depicted Vulcan, bearded and brawny—wearing only gladiator sandals and a blacksmith's leather apron—examining a spear point held in one hand and resting a hammer in his other hand on a tree stump. Except for minor changes (the stump became an anvil), this model closely resembled the final version.

Moretti handled the daunting scale of the full-sized figure by producing half of it at a time, in an unfinished church in Passaic, New Jersey. There he began by sculpting clay applied to a wooden armature. He covered this with burlap-reinforced plaster, which was then used to mold plaster casts. (A photograph splashed across newspapers in New York and Chicago showed a carriage passing between the towering legs of Vulcan's lower half.) The plaster giant was shipped to Birmingham in pieces, from which brick-and-loam molds were formed to make the cast-iron Vulcan. The statue was cast in 15 parts and bolted together internally. Making such large, complicated molds

taxed the skills of the city's best foundrymen, who toiled 60 hours a week for four months.

In a fundraising campaign that tried every gambit from benefit baseball games to selling statuettes, captains of industry anted up as did the United Mine Workers. Perhaps the rank and file saw Vulcan as a fellow laborer, steeped in the travails of ore and forge. Even Moretti, known for his baritone voice, sang a solo to help the cause.

When the St. Louis fair opened on April 30, 1904, Vulcan was there, if only up to his knees, as work at the foundry continued at a feverish pace. But the Brobdingnagian calves and Ben-Hur sandals alone inspired awe. No doubt these fragments evoked the crumbled colossi of the ancient world. In less than a month, they were joined by the rest of the statue. It dwarfed everything else in the Palace of Mines and Metallurgy. The upraised spear point almost touched the ceiling. During the fair's seven-month run, thousands of visitors came to gape at Vulcan. The statue won a grand prize, while Moretti and the foundry received medals. San Francisco made a bid for Vulcan, but the Commercial Club was determined to bring the Iron Man home.

Once back in Birmingham, however, Vulcan went from icon to outcast. Many civic boosters wanted to place him in the city's main square, now called Linn Park. Today framed by government buildings and office towers, in 1906 the park was surrounded by expensive homes. And the upper-class ladies of those houses were not about to welcome a bare-bottom Roman giant into their midst. They deemed Vulcan ugly and ill-proportioned. He was no Adonis, certainly: Moretti had scaled up the head and upper body, which makes the statue appear more realistic when viewed from below. In a *Birmingham Age-Herald* story, one woman spoke for many: "Vulcan belongs on [the nearby 1,000-foot] Red Mountain. It was never intended to be in a park with smaller monuments."

In fact, at the time, Vulcan *was* on Red Mountain—dismembered and

At the St. Louis fair, the Brobdingnagian calves and Ben-Hur sandals alone inspired awe.

Undeterred by tight deadlines, Moretti (in 1903) sang a solo to help raise funds.

scattered on the ground after being dumped there because of unpaid freight fees. He would ultimately find an upright home on the mountain years later, but not before more tribulations.

After months of debate, the Alabama State Fairgrounds offered Vulcan a perch. For three decades the statue loomed over the fairground racetrack. Parents would tell their children, "If you get lost, meet me at Vulcan's feet." But in this incarnation, his upper extremities had been hastily and improperly reassembled, and he no longer held the spear point and hammer. Worse, fair managers turned him into a billboard. An ice-cream company put a plaster cone in his left hand. He promoted Coca-Cola and Heinz 57 pickles. As workers took to the bread lines in the early 1930s, Vulcan also hit the skids, restyled with black eyebrows, rouged cheeks and a gigantic pair of overalls from a local manufacturer.

The New Deal helped bail out Birmingham and its fallen god. With the help of WPA funds, the statue became the centerpiece of an inviting new park at the crest of Red Mountain. Placed on a stone-clad pedestal 12 stories high, overlooking the main north-south highway, he could be seen for miles. "Vulcan had a magnetic attraction for people," says Marjorie White, director of the Birmingham Historical Society. They came to enjoy the vistas from the pedestal's viewing platform, to picnic and fly kites and propose marriage.

But in 1946 local Jaycees turned him into a traffic safety beacon. His spear point was wrapped in a neon-lit cone; normally green, it glowed red for 24 hours after every local traffic fatality. An unfortunate "modernization" completed in 1971 produced a bulky, marble-clad pedestal and visitors' platform that curtailed close-up views of the statue.

By the '90s the once-buff behemoth was rapidly succumbing to cracks and corrosion. In 1999 the Vulcan Park Foundation was formed to restore him to his 1904 prime (though half of those polled wanted to keep his traffic beacon role). Workers repaired and recast damaged parts and, using historical photographs, re-created the missing spear point and hammer. Ten-acre Vulcan Park was brought back to its rustic, WPA-era origins. Today, the muscular figure stands once again on a slender, 124-foot stone pedestal, above a new visitors center that illuminates the history of Birmingham and its ferrous mascot. Vulcan was rotated slightly to put his anvil closer to its original position. But his bare derrière still faces a suburb to the south—a feature known locally as "Moon over Homewood."

Once Vulcan surveyed a landscape of fiery mills and soot-stained air; today this uniquely American alloy of industry and artistry, capital and labor, carnival hype and pure civic pride watches over a postindustrial center of banking and medicine. Newly resplendent, he's ready for his next hundred years. ○

JEFF BOOK, a senior editor at Coastal Living *magazine, lives in Birmingham.*

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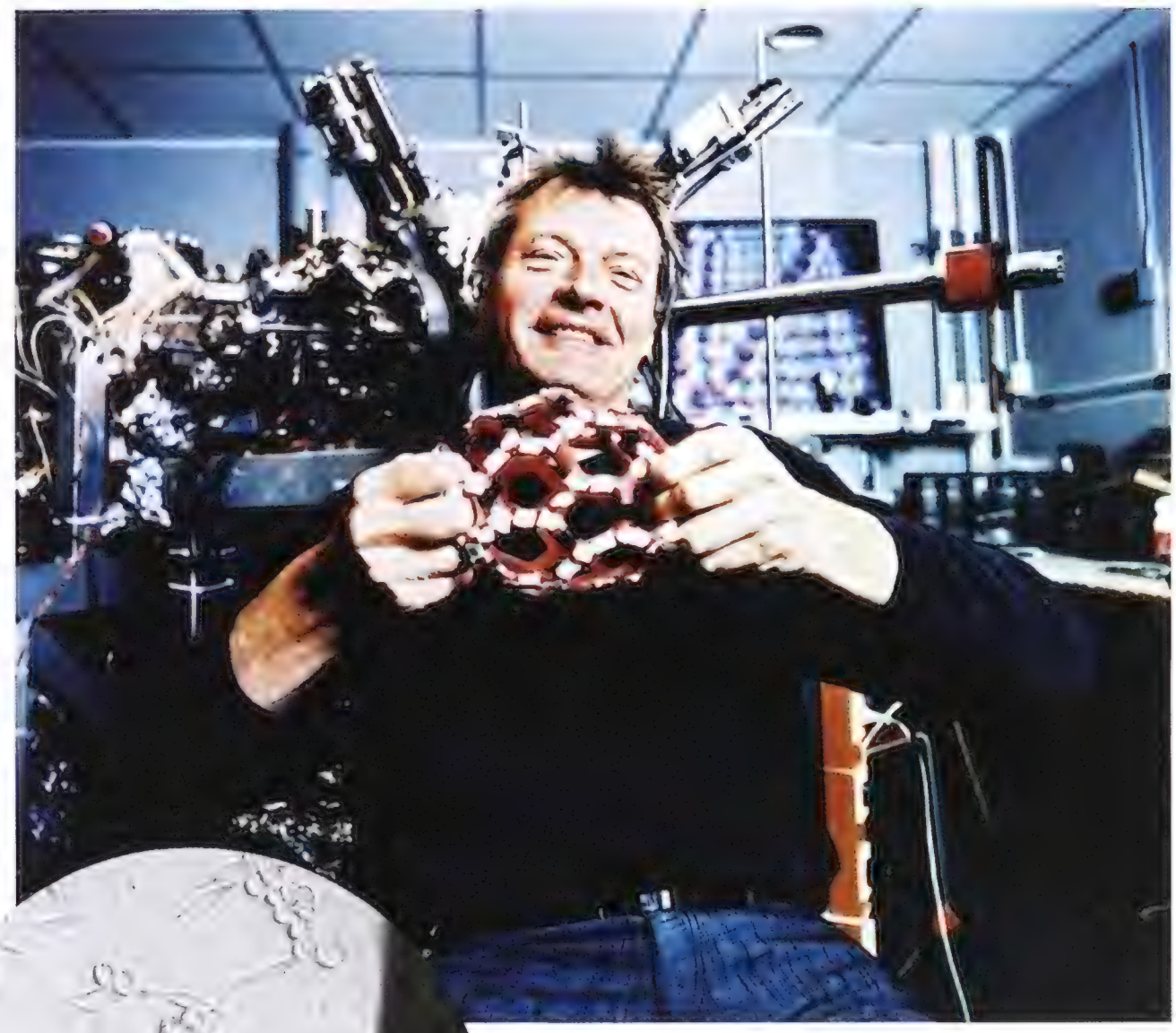
Signal Discovery?

A Los Angeles scientist says living cells may make distinct sounds, which might someday help doctors "hear" diseases ~ BY MARK WHEELER

KIDS, LAWN MOWERS, planes, trains, automobiles—just about everything makes noise. And if two California scientists are right, so, too, do living cells. In recent experiments using the frontier science of nanotechnology, the researchers have found evidence that yeast cells give off one kind of squeal while mammalian cells may give off another. The research, though still preliminary, is potentially "revolutionary," as one scientist puts it, and a possible, admittedly far-off medical application, is already being pursued: someday, the thinking goes, listening to the sounds your cells make might tell a doctor, before symptoms occur, whether you're healthy or about to be ill.



Gimzewski (holding a model of a carbon molecule in his UCLA lab) uses an atomic force microscope (left, atop a bone cell) to "listen" to living cells.

The founder of the study of cell sounds, or "sonocytology," as he calls it, is Jim Gimzewski, a 52-year-old UCLA chemist who has contributed to an art museum's exhibit on molecular structure. The cell sounds idea came to him in 2001 after a medical researcher told him that when living heart cells are placed in a petri dish with appropriate nutrients, the cells will continue to pulsate. Gimzewski began wondering if all cells might beat, and if so, would such tiny vibrations produce a detectable sound. After all, he reasoned, sound is merely the result of a force pushing on molecules, creating a pressure wave that spreads and registers when it strikes the eardrum. He also reasoned that although a noise generated by a cell would not be audible, it might be detected by an especially sensitive instrument.

Gimzewski is well suited to tackle the question, being both an expert at instrumentation—he has built his own microscopes—and comfortably at home in the world of the infinitesimal. A leader in nanotechnology, or the science of manipulating individual atoms and molecules to build microscopic machines, Gimzewski previously worked at IBM's research laboratory in Zurich, Switzerland, where he and his colleagues built a spinning molecular propeller 1.5 nanometers, or 0.0000015 millimeters in diameter. They also built the world's smallest abacus, which had, as beads, individual molecules with diameters less than a single nanometer. If nothing else, the feats, which garnered considerable acclaim, showed that nanotechnology's much-hyped promise had a basis in reality.

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The thought of detecting cancer at its earliest stages is exciting.

For his first foray into sonocytology, Gimzewski obtained yeast cells from biochemistry colleagues at UCLA. (He "got looks," he recalls, when he explained why he wanted the cells.) Working with graduate student Andrew Pelling, Gimzewski devised a way to test for cellular noise with a nanotechnology tool called an atomic force microscope (AFM). Usually, an AFM creates a visual image of a cell by passing its very tiny probe, itself so small its tip is microscopic, over the cell's surface, measuring every bump and hollow of its outer membrane. A computer converts the data into a picture. But the UCLA researchers held the AFM's tiny probe in a fixed position, resting it lightly on the surface of a cell membrane "like a record needle," says Pelling, to detect any sound-generating vibrations.

The pair found that the cell wall rises and falls three nanometers (about 15 carbon atoms stacked on top of each other) and vibrates an average of 1,000 times per second. The distance the cell wall moves determines the amplitude, or volume, of the sound wave, and the speed of the up-and-down movement is its frequency, or pitch. Though the volume of the yeast cell sound was far too low to be heard, Gimzewski says its frequency was theoretically within the range of human hearing. "So all we're doing is turning up the volume," he adds.

The frequency of the yeast cells the researchers tested has always been in the same high range, "about a C-sharp to D above middle C in terms of music," says Pelling. Sprinkling alcohol on a yeast cell to kill it raises the pitch, while dead cells give off a low, rumbling sound that Gimzewski says is probably the result of random atomic motions. The pair also found that yeast cells with genetic mutations make a slightly different sound than normal yeast cells; that insight has encouraged the hope that the technique might eventually be applied to diagnosing diseases such as cancer, which is believed to originate with changes in the genetic makeup of cells. The researchers have begun to test different kinds of mammalian cells, including bone cells, which have a lower pitch than yeast cells. The researchers don't know why.

Few scientists are aware of Gimzewski's and Pelling's sonocytology work, which has not been published in the scientific literature and scrutinized. (The researchers have submitted their findings to a peer-reviewed journal for publication.) Word of mouth has prompted skepticism as well as admiration. A scientist familiar with the research, Hermann Gaub, chair of applied physics at the Ludwig Maximilian University in Munich, Germany, says the sounds that Gimzewski believes are cellular vibrations may have other origins. "If the source of this vibration would be found inside the cell, this would be revolutionary, spectacular, and unbelievably important," Gaub says. "There are, however, many potential [sound] sources outside the cell that need to be excluded." Pelling agrees, and says that he and Gimzewski are doing tests to rule out the possibility that other molecules in the fluid bathing the cells, or even the tip of the microscope itself, are generating vibrations that their probe picks up.

Live yeast cells seems to squeal above the middle C note, the researchers say, but not dead ones (above).

Ratnesh Lal, a neuroscientist and biophysicist at the University of California at Santa Barbara who has studied the pulsations of heart cells kept alive in a dish, says that Gimzewski's nanotechnology expertise may be the key to establishing whether cells produce sound. "The ultimate hope is to use this in diagnostics and prevention," says Lal, adding: "If there's anybody in the world who can do it, he can."

Gimzewski acknowledges more work needs to be done. Meanwhile, the findings have caught the attention of his UCLA colleague Michael Teitell, a pathologist specializing in cancers of the lymphocyte, a type of white blood cell. He's subjecting human and mouse muscle cells and bone cells to drugs and chemicals to induce genetic and physical changes; Gimzewski will then try to "listen" to the altered cells and distinguish them by their sounds.

Teitell says the thought of detecting cancer at its earliest cellular stages is exciting, but whether the technology will work as a diagnostic tool remains to be seen (or heard). He doesn't want to oversell the idea: "It could turn out that all these signals will be such a mishmash that we won't be able to clearly identify one from the other."

Gimzewski hopes the work will have a practical application, but he's thrilled as much by the hunt as the catch. "Whatever the outcome," he says, "I'm primarily driven by curiosity and excitement at the phenomenon of cellular motion—what inspired nature to create such a mechanism and to really understand in depth what these beautiful sounds mean." The mere possibility that he's discovered a new characteristic of cells, with all the intriguing questions that raises, is, he says, "already more than enough of a gift." ○

MARK WHEELER, a writer based in Los Angeles, specializes in science stories.

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HYLAN G-F 20

BRIEF SUMMARY OF PRESCRIBING INFORMATION

This Summary describes Synvisc, a prescription formulation of hylan G-F 20 for knee pain due to osteoarthritis. Be sure to read the following important information carefully. This information does not take the place of your doctor's advice. If you do not understand this information or want to know more, ask your doctor.

WHAT IS SYNVISC?

Synvisc is a gel-like mixture that is made up of hylan A fluid, hylan B gel, and salt water. Hylan A and hylan B are made from a substance called hyaluronan (pronounced hye-a-loo-ROE-nan), also known as sodium hyaluronate that comes from chicken combs. This is a natural substance found in the body and is present in very high amounts in joints. The body's own hyaluronan acts like a lubricant and a shock absorber in the joint and is needed for the joint to work properly. Osteoarthritis (pronounced os-TE-o-ar-THRI-tis) (OA) is a type of arthritis that involves the wearing down of cartilage (the protective covering on the ends of your bones). In OA, there may not be enough hyaluronan, and there may be a decrease in the quality of the hyaluronan in the joint. Synvisc has comparable viscous and elastic properties to synovial fluid of 18- to 27-year-old healthy human knees. Synvisc is given by a series of injections directly into your knee.

WHAT IS SYNVISC USED FOR?

Synvisc is used to relieve knee pain due to osteoarthritis. It is used for patients who do not get adequate relief from simple painkillers or from exercise and physical therapy. The most pain relief and the greatest amount of treatment success occurred 8 to 12 weeks after Synvisc treatment began.

HOW CAN I GET MORE INFORMATION ABOUT SYNVISC?

If you have any questions or would like to find out more about Synvisc, you may call Wyeth-Ayerst Pharmaceuticals, at 1-800-99-WYETH.

CONTRAINDICATIONS

- Do not administer to patients with known hypersensitivity (allergy) to hyaluronan (sodium hyaluronate) preparations.
- Do not inject Synvisc in the knees of patients having knee joint infections or skin diseases or infections in the area of the injection site.

WARNINGS

- Do not concomitantly use disinfectants containing quaternary ammonium salts for skin preparation because hyaluronan can precipitate in their presence.
- Do not inject Synvisc extra-articularly, or into the synovial tissues and capsule. Local and systemic adverse events, generally in the area of the injection, have occurred following extra-articular injection of Synvisc.
- Intravascular injections of Synvisc may cause systemic adverse events.

PRECAUTIONS

General

- The effectiveness of a single treatment cycle of less than three injections of Synvisc has not been established.
- The safety and effectiveness of Synvisc in locations other than the knee and for conditions other than osteoarthritis have not been established.
- Do not inject anesthetics or other medications into the knee joint during Synvisc therapy. Such medications may dilute Synvisc and affect its safety and effectiveness.
- Use caution when injecting Synvisc into patients who are allergic to avian proteins, feathers, and egg products.
- The safety and effectiveness of Synvisc in severely inflamed knee joints have not been established.
- Strict aseptic administration technique must be followed.
- STERILE CONTENTS. The syringe is intended for single use. The contents of the syringe must be used immediately after its packaging is opened. Discard any unused Synvisc.
- Do not use Synvisc if package is opened or damaged. Store in original packaging (protected from light) at room temperature below 86°F (30°C). DO NOT FREEZE.
- Remove synovial fluid or effusion before each Synvisc injection.
- Synvisc should be used with caution when there is evidence of lymphatic or venous stasis in that leg.

Information for Patients

- Provide patients with a copy of the Patient Labeling prior to use.
- Transient pain, swelling, and/or effusion of the injected joint may occur after intra-articular injection of Synvisc. In some cases, the effusions may be considerable and cause pronounced pain; cases where swelling is extensive should be discussed with the physician.
- As with any invasive joint procedure, it is recommended that the patient avoid any strenuous activities or prolonged weight-bearing activities such as jogging or tennis following the intra-articular injection.
- The safety and effectiveness of repeat treatment cycles of Synvisc have not been established.
- The packaging of this product contains dry natural rubber latex.

Use in Specific Populations

- **Pregnancy:** The safety and effectiveness of Synvisc have not been established in pregnant women.
- **Nursing mothers:** It is not known if Synvisc is excreted in human milk. The safety and effectiveness of Synvisc have not been established in lactating women.
- The safety and effectiveness of Synvisc have not been established in children.

ADVERSE EVENTS

Adverse Events Involving the Injected Joint

Clinical Trials

A total of 511 patients (559 knees) received 1771 injections in seven clinical trials of Synvisc. There were 39 reports in 37 patients (2.2% of injections, 7.2% of patients) of knee pain and/or swelling after these injections. Ten patients (10 knees) were treated with arthrocentesis and removal of joint effusion. Two additional patients (two knees) received treatment with intra-articular steroids. Two patients (two knees) received NSAIDs. One of these patients also received arthrocentesis. One patient was treated with arthroscopy. The remaining patients with adverse events localized to the knee received no treatment or only analgesics.

Postmarket Experience

The most common adverse events reported have been pain, swelling and/or effusion involving the injected knee. In some cases, the effusion was considerable and caused pronounced pain. In some instances, patients have presented with knees that were tender, warm and red. It is important to rule out infection or crystalline arthropathies in such cases. Synovial fluid aspirates of varying volumes have revealed a range of cell counts, from very few to over 50,000 cells/mm^3. Reported treatments have included symptomatic therapy (e.g., rest, ice, heat, elevation, simple analgesics and NSAIDs) and/or arthrocentesis. Intra-articular corticosteroids have been used when infection was excluded. Patients have rarely undergone arthroscopy or other procedures. Reactions generally abate within a few days. Clinical benefit from treatment may still occur after such reactions.

Intra-articular infections did not occur in any of the clinical trials and have been reported only rarely during clinical use of Synvisc.

Other Adverse Events

Clinical Trials

In three concurrently controlled clinical trials with a total of 112 patients who received Synvisc and 110 patients who received either saline or arthrocentesis, there were no statistically significant differences in the numbers or types of adverse events between the group of patients that received Synvisc and the group that received control treatments. Systemic adverse events occurred in 10 (2.0%) of the Synvisc-treated patients. There was one case each of rash (thorax and back) and itching of the skin following Synvisc injections in these studies. These symptoms did not recur when these patients received additional Synvisc injections. The remaining generalized adverse events reported were calf cramps, hemorrhoid problems, ankle edema, muscle pain, tonsillitis with nausea, tachyarrhythmia, phlebitis with varicosities and low back sprain.

Postmarket Experience

Other adverse events reported include: rash, *hives*, itching, *fever*, nausea, *headache, dizziness, chills*, muscle cramps, *paresthesia*, peripheral edema, *malaise, respiratory difficulties, flushing and facial swelling.* There have been rare reports of *thrombocytopenia* coincident with Synvisc injection. (Adverse events reported *only* in worldwide postmarketing experience, not seen in clinical trials, are considered more rare and are *italicized*.)

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Synvisc® is covered by U.S. patents.
This summary provides the most important information about Synvisc. If you want to read more, ask your doctor or pharmacist to let you read the professional labeling.
This Brief Summary for Direct-to-Consumer advertising is based on Synvisc Physician Insert, CI 6082-4, Revised April 11, 2003, and Synvisc Patient Information Insert, PI 5015-9, Revised September 8, 2003.

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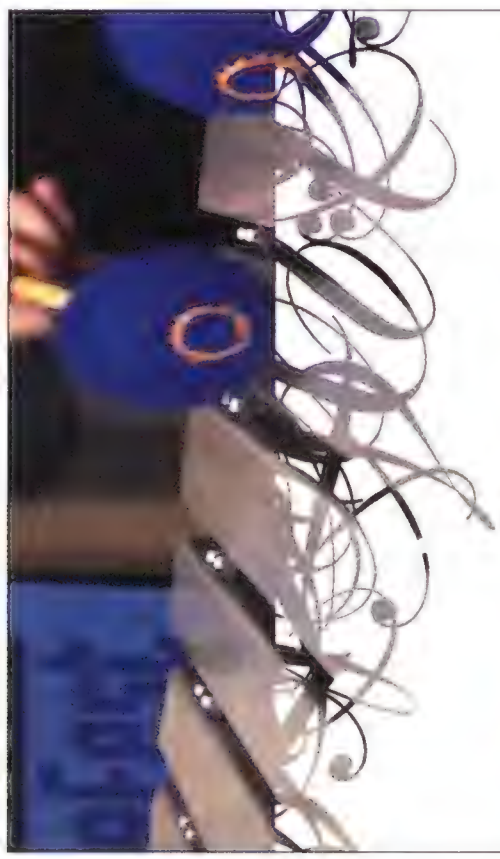
Important information about insurance coverage for SYNVISC treatments

SYNVISC is eligible for reimbursement by most insurance plans. Many require that your physician provide SYNVISC. If your physician does not provide SYNVISC and he or she writes a prescription for SYNVISC, some insurance plans, including Medicare, may not cover the cost. Therefore, it is recommended that you ask your physician if his or her office provides SYNVISC. Procedures vary from policy to policy, so please check with your physician and/or your insurer. If you have additional questions about insurance coverage, please contact the SYNVISC Reimbursement Hot Line at 1-800-982-8292. This toll-free number can be accessed between 9:00 a.m. and 6:00 p.m., Eastern Time, Monday through Friday.



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Osage Oranges Take a Bough

The first shipment of botanical specimens sent to President Jefferson contained the seeds of thousands of miles of fences

In his 1803 directive outlining his goals for the expedition, President Thomas Jefferson instructed Meriwether Lewis to record "the soil & face of the country, it's growth & vegetable productions, especially those not of the U.S. [and] the dates at which particular plants put forth or lose their flower, or leaf."

Lewis had been taught by his mother, a lay healer, about the medicinal properties of plants. And as part of his expedition preparations, Jefferson had sent him to Benjamin Smith Barton, a lecturer at the University of Pennsylvania and author of the first botany text published in the United States. Under Barton's tutelage, Lewis learned how to preserve and label flora. (He would bring back more than 200 plant specimens, which are preserved at the Lewis and Clark Herbarium at the Academy of Natural Sciences in Philadelphia.)

*In March 1804, while Lewis was in St. Louis attending the Louisiana Territory transfer ceremonies, he sent Jefferson a shipment of botanical specimens, including live Osage apple cuttings (*Maclura pomifera, *now known as the Osage orange). Though they did not survive, some samples Lewis collected in 1807 did, and as Susan H. Munger writes in* Common to This Country: Botanical Discoveries of Lewis and Clark, *"trees growing in Philadelphia and at the University of Virginia are said to be direct descendants of the cuttings sent back by Lewis."*

The Osage orange, which Lewis obtained from Pierre Chouteau, a former Indian agent, was probably the espedition's most significant botanical discovery. The plant's long thorns created a virtually impenetrable hedge, and later in the 19th century, many thousands of miles of these trees would be planted as frontier fencing. The fragrant tree held its popularity as a barrier until it was eclipsed by barbed wire in the 1880s.

Thanks to Lewis, the prickly Osage orange would bloom all over the West.

Dear Sir,
St. Louis March 26th 1804.

I send you herewith inclosed, some slips of the Osages *Plums*, and *Apples*. I fear the season is too far advanced for their success. Had I earlyer learnt that these fruits were in the neighbourhood, they would have been forwarded at a more proper time. . . . I obtained the cuttings, now sent you, from the garden of Mr. Peter Choteau, who resided the greater portion of his time for many years with the Osage nation. . . .

The *Osage Apple* is a native of the interior of the continent of North America, and is perhaps a nondiscript production; the information I have obtained with respect to it is not so minute as I could wish, nor such as will enable me to discribe it in a satisfactory manner. Mr. Peter Coteau . . . obtained the young plants at the great Osage vilage from an Indian of that nation. . . . The general contour of this tree, is very much that of the *black haw*, common to most parts of the U. States. . . . So much do the savages esteem the wood of this tree for the purpose of making their bows, that they travel many hundred miles in quest of it. The particulars with respect to the fruit, is taken principally from the Indian discription; my informant never having seen but one specimen of it, which was not fully ripe, and much shrivled and mutilated before he saw it. The Indians give an extravigant account of the exquisite odour of this fruit when it has obtained maturity, which takes place the latter end of summer, or the begining of Autumn. They state, that at this season they can always tell by the scent of the fruit when they arrive in the neighbourhood of the tree, and usually take advantage of this season to obtain the wood. . . . An opinion prevails among the Osages, that the fruit is poisonous, tho' they acknowledge that they have never tasted it. They say that many anamals feed on it, and among others, a large species of *Hare* which abounds in that country. This fruit is the size of the largest orange, of a globular form, and a fine orange colour. . . .

I have the honour to be with sincere esteem Your Obt. Servt.
Meriwether Lewis
Capt. 1st U.S. Infty. ○

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COURT OF APPEAL A U.S. Army soldier takes his best shot at a palace in Tikrit, Iraq, abandoned by Saddam Hussein. The opulent, marbled hall turned basketball court (complete with regulation size hoop) provides diversion for soldiers of the 4th Infantry Division, who have faced attacks since the U.S.-led occupation began last April. Photograph by Mauricio Lima/AFP/Getty Images.

—*HELEN STARKWEATHER*

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Who is the Artist?

A team of artists turned up at the Hirshhorn Museum to carry out Sol LeWitt's vision of a wall mural. Is he the artist or are they?

WHEN TOMAS RAMBERG, 30, and Megan Dyer, 34, arrived from New York City at the Hirshhorn Museum in Washington, D.C., they spread out paint-spattered tarps and set up scaffolding and ladders. Before long the museum's Lerner Gallery was littered with masking tape, paint cans, brushes and water buckets. Assisted by a crew of five, the pair labored for nearly three weeks before unveiling, on the last day of 2003, two floor-to-ceiling mosaics, one a pyramid of red, yellow, blue, green, purple and orange, the other a bold cube within a square. But the artist responsible for the compositions had never set foot in the gallery.

Conceptual artist Sol LeWitt, 75, has long made a habit of hiring other artists to execute his compositions. "The idea or concept is the most important aspect of the work," wrote LeWitt in 1967. He is a leader of the 1960s movement that pushed art off the canvas into the realm of ideas.

Its proponents believe that the handoff of a project from creator to draftsperson is not unlike that of architect to builder. "All of the planning and decisions are made beforehand . . . ." wrote LeWitt of his wall drawings. "The execution is a perfunctory affair."

Or is it? LeWitt's artists or, as he calls them, his "draftspeople"—which currently number ten in New

Execution is perfunctory, says Sol LeWitt (above, in 2000). "Idea becomes the machine that makes the art." Says curator Phyllis Rosenzweig of the LeWitt works (below, creating *Wall Drawing #113*), "In my opinion, the real work of art is the idea."

AFP PHOTOS: CORBIS; CHRIS SMITH; HIRSHHORN M. AND M. ANDERSON; [illegible]

York City and three in the Netherlands and Germany—enlarge his designs and map them directly onto the gallery's walls. But they are also licensed to make changes to LeWitt's signed instructions and diagrams, which don't look all that different from a paint-by-number kit. In fact, for one of the mosaics, Ramberg switched the green and purple rectangles "to get the sense of randomness just right." LeWitt, he said, would not mind at all. "Sol likes surprises."

"It's a very democratic process," adds Dyer. Each of us is making decisions while we're executing the piece."

What the Hirshhorn actually owns is a deed for the plans—the paintings may be executed at the museum's whim (depending on the availability of LeWitt's disciples) and may be painted over. Obviously, the process begs a question: Is the artwork the instructions or is it the work on the wall? As critic Peter Schjeldahl once noted, "You can raise hairs on the back of your neck thinking about this."

Both Dyer and Ramberg are themselves artists. Dyer makes portraits using a technique she describes as a cross between painting and digital imaging; Ramberg combines painting with photography. (His works will be on view through the end of this month at New York City's Trygve Lie Gallery.)

As coat after coat of paint went on the Hirshhorn's walls, chatter among local participating artists—Patrick Burns, Larry Colbert, Joy Hayes, Stephens J. Carter and Michele Talibah—mingled with directives from Ramberg and Dyer. Keep razor-straight edges, the pair advised, as they fielded questions about color choice and touch ups. Wandering by, a visitor, attracted by the noise and sight of so many worker bees, asked which was the artist. "Well, we all are, and yet none of us is," said Dyer, "but Sol LeWitt is back in his studio, creating new works for us."

—SIDNEY LAWRENCE

FROM THE ATTIC

FOUND AND LOST Smithsonian archaeologist Ralph Solecki says he felt a twinge of excitement when he first laid eyes on northern Iraq's Shanidar cave in 1951 and saw its huge 82-foot-wide opening. There, starting in 1953, Solecki would recover nine Neanderthal skeletons and determine that the Paleolithic beings were more humanlike than previously thought, caring for their sick and elderly, and ritualistically burying their dead. His ideas would inspire fiction writer Jean Auel, whose characters Creb and Iza in 1980's *Clan of the Cave Bear* were based on Shanidar skeletons. "The expedition was a lot of work," recalls Solecki, 86, now professor emeritus at Columbia University. Constantly fearful of cave-ins and earthquakes, the archaeologist fretted over his crew of 21 Kurdish workers as they hurried in and out of the 28-foot-wide excavation pit with sackfuls of dirt via two ladders. By 1978 the political scene had changed drastically, and Solecki was given a military escort away from the cave when he tried to resume work there. Today, one Shanidar skeleton is housed in the Smithsonian's National Museum of Natural History along with casts of the other eight Shanidar skeletons. The originals remained in Iraq, and are now presumed lost. "So," says Rick Potts, head of the Smithsonian's Human Origins Program, "we treat the casts as if they were the originals." *–BETH PY-LIEBERMAN*

SMITHSONIAN INSTITUTION ARCHIVES

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Relieve the heartburn. Heal the damage.

NEXIUM tackles acid reflux at the source. That's important because even a little heartburn, over time, can still mean serious damage to your esophagus. For most people, NEXIUM heals that damage. Your results may vary.

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NEXIUM works by "turning off" many of the pumps that produce acid. Once the amount of acid has been reduced, NEXIUM can begin to heal any erosions caused by acid reflux disease. Most erosions heal in 4 to 8 weeks with NEXIUM. Your results may vary.

Talk with your health care professional to see if NEXIUM is right for you. NEXIUM has a low occurrence of side effects, including headache, diarrhea and abdominal pain. Symptom relief does not rule out serious stomach conditions.

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(esomeprazole magnesium)

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BRIEF SUMMARY Before prescribing NEXIUM, please see full Prescribing Information. **INDICATIONS AND USAGE** NEXIUM is indicated for the short-term treatment (4 to 8 weeks) in the healing and symptomatic resolution of diagnostically confirmed erosive esophagitis. **CONTRAINDICATIONS** NEXIUM is contraindicated in patients with known hypersensitivity to any component of the formulation or to substituted benzimidazoles. **PRECAUTIONS** Symptomatic response to therapy with NEXIUM does not preclude the presence of gastric malignancy. Atrophic gastritis has been noted occasionally in gastric corpus biopsies from patients treated long-term with omeprazole, of which NEXIUM is a constituent. **Information for Patients** NEXIUM Delayed-Release Capsules should be taken at least one hour before meals. For patients with difficulty swallowing capsules, one tablespoon of applesauce can be added to an empty bowl and the NEXIUM Delayed-Release Capsule can be opened and the pellets carefully emptied onto the applesauce. The pellets should be mixed with the applesauce and then swallowed immediately. The applesauce must not be hot and should be soft enough to be swallowed without chewing. The pellets should not be chewed or crushed. The pellet-applesauce mixture should not be stored for future use. Antacids may be used while taking NEXIUM. **Drug Interactions** Esomeprazole is extensively metabolized in the liver by CYP2C19 and CYP3A4. In vitro and in vivo studies have shown that esomeprazole is not likely to inhibit CYPs 1A2, 2A6, 2C9, 2D6, 2E1 and 3A4. No clinically relevant interactions with drugs metabolized by these CYP enzymes would be expected. Drug interaction studies have shown that esomeprazole does not have any clinically significant interactions with phenytoin, warfarin, quinidine, clarithromycin or amoxicillin. Post-marketing reports of changes in prothrombin measures have been observed among patients on concomitant warfarin and esomeprazole therapy. Increases in INR and prothrombin time may lead to abnormal bleeding and even death. Patients treated with proton pump inhibitors and warfarin concomitantly may need to be monitored for increases in INR and prothrombin time. Esomeprazole may potentially interfere with CYP2C19, the major esomeprazole metabolizing enzyme. Coadministration of esomeprazole 30 mg and diazepam, a CYP2C19 substrate, resulted in a 45% decrease in clearance of diazepam, decreased plasma levels of diazepam were observed 12 hours after dosing and onwards. However, at that time, the plasma levels of diazepam were below the therapeutic interval, and thus this interaction is unlikely to be of clinical relevance. Esomeprazole inhibits gastric acid secretion. Therefore, esomeprazole may interfere with the absorption of drugs where gastric pH is an important determinant of bioavailability (e.g., ketoconazole, iron salts and digoxin). Coadministration of oral contraceptives, diazepam, phenytoin, or quinidine did not seem to change the pharmacokinetic profile of esomeprazole. **Carcinogenesis, Mutagenesis, Impairment of Fertility** The carcinogenic potential of esomeprazole was assessed using omeprazole studies. In two 24-month oral carcinogenicity studies in rats, omeprazole at daily doses of 1.7, 3.4, 13.8, 44.0 and 140.8 mg/kg/day (about 0.7 to 57 times the human dose of 20 mg/day, expressed on a body surface area basis) produced gastric ECL cell carcinoids in a dose-related manner in both male and female rats; the incidence of this effect was markedly higher in female rats, which had higher blood levels of omeprazole. Gastric carcinoids seldom occur in the untreated rat. In addition, ECL cell hyperplasia was present in all treated groups of both sexes. In one of these studies, female rats were treated with 13.8 mg omeprazole/kg/day (about 5.6 times the human dose on a body surface area basis) for 1 year, then followed for an additional year without the drug. No carcinoids were seen in these rats. An increased incidence of treatment-related ECL cell hyperplasia was observed at the end of 1 year (94% treated vs 10% controls). By the second year the difference between treated and control rats was much smaller (46% vs 26%) but still showed more hyperplasia in the treated group. Gastric adenocarcinoma was seen in one rat (2%). No similar tumor was seen in male or female rats treated for 2 years. For this strain of rat no similar tumor has been noted historically, but a finding involving only one tumor is difficult to interpret. A 78-week mouse carcinogenicity study of omeprazole did not show increased tumor occurrence, but the study was not conclusive. Esomeprazole was negative in the Ames mutation test, in the *in vivo* rat bone marrow cell chromosome aberration test, and the *in vivo* mouse micronucleus test. Esomeprazole, however, was positive in the *in vitro* human lymphocyte chromosome aberration test. Omeprazole was positive in the *in vitro* human lymphocyte chromosome aberration test, the *in vivo* mouse bone marrow cell chromosome aberration test, and the *in vivo* mouse micronucleus test. The potential effects of esomeprazole on fertility and reproductive performance were assessed using omeprazole studies. Omeprazole at oral doses up to 138 mg/kg/day in rats (about 56 times the human dose on a body surface area basis) was found to have no effect on reproductive performance of parental animals. **Pregnancy** *Teratogenic Effects. Pregnancy Category B*—Teratology studies have been performed in rats at oral doses up to 280 mg/kg/day (about 57 times the human dose on a body surface area basis) and in rabbits at oral doses up to 86 mg/kg/day (about 35 times the human dose on a body surface area basis) and have revealed no evidence of impaired fertility or harm to the fetus due to esomeprazole. There are, however, no adequate and well-controlled studies in pregnant women. Because animal reproduction studies are not always predictive of human response, this drug should be used during pregnancy only if clearly needed. Teratology studies conducted with omeprazole in rats at oral doses up to 138 mg/kg/day (about 56 times the human dose on a body surface area basis) and in rabbits at doses up to 69 mg/kg/day (about 56 times the human dose on a body surface area basis) did not disclose any evidence for a teratogenic potential of omeprazole. In rabbits, omeprazole in a dose range of 6.9 to 69.1 mg/kg/day (about 5.5 to 56 times the human dose on a body surface area basis) produced dose-related increases in embryo-lethality, fetal resorptions, and pregnancy disruptions. In rats, dose-related embryo/fetal toxicity and postnatal developmental toxicity were observed in offspring resulting from parents treated with omeprazole at 13.8 to 138.0 mg/kg/day (about 5.6 to 56 times the human doses on a body surface area basis). There are no adequate and well-controlled studies in pregnant women. Sporadic reports have been received of congenital abnormalities occurring in infants born to women who have received omeprazole during pregnancy. **Nursing Mothers** The excretion of esomeprazole in milk has not been studied. However, omeprazole concentrations have been measured in breast milk of a woman following oral administration of 20 mg. Because esomeprazole is likely to be excreted in human milk, because of the potential for serious adverse reactions in nursing infants from esomeprazole, and because of the potential for tumorigenicity shown for omeprazole in rat carcinogenicity studies, a decision should be made whether to discontinue nursing or to discontinue the drug, taking into account the importance of the drug to the mother. **Pediatric Use** Safety and effectiveness in pediatric patients have not been established. **Geriatric Use** Of the total number of patients who received NEXIUM in clinical trials, 778 were 65 to 74 years of age and 124 patients were ≥ 75 years of age. No overall differences in safety and efficacy were observed between the elderly and younger individuals, and other reported clinical experience has not identified differences in responses between the elderly and younger patients, but greater sensitivity of some older individuals cannot be ruled out. **ADVERSE REACTIONS** The safety of NEXIUM was evaluated in over 10,000 patients (aged 18-84 years) in clinical trials worldwide including over 7,400 patients in the United States and over 2,600 patients in Europe and Canada. Over 2,900 patients were treated in long-term studies for up to 6-12 months. In general, NEXIUM was well tolerated in both short- and long-term clinical trials. The safety in the treatment of healing of erosive esophagitis was assessed in four randomized comparative clinical trials, which included 1,240 patients on NEXIUM 20 mg, 2,434 patients on NEXIUM 40 mg, and 3,008 patients on omeprazole 20 mg daily. The most frequently occurring adverse events (≥1%) in all three groups was headache (5.5, 5.0, and 3.8, respectively) and diarrhea (no difference among the three groups). Nausea, flatulence, abdominal pain, constipation, and dry mouth occurred at similar rates among patients taking NEXIUM or omeprazole. Additional adverse events that were reported as possibly or probably related to NEXIUM with an incidence < 1% are listed below by body system: ***Body as a Whole:*** abdomen enlarged, allergic reaction, asthenia, back pain, chest pain, chest pain substernal, facial edema, peripheral edema, hot flushes, fatigue, fever, flu-like disorder, generalized edema, leg edema, malaise, pain, rigors; ***Cardiovascular:*** flushing, hypertension, tachycardia; ***Endocrine:*** goiter; ***Gastrointestinal:*** bowel irregularity, constipation aggravated, dyspepsia, dysphagia, dysplasia GI, epigastric pain, eructation, esophageal disorder, frequent stools, gastroenteritis, GI hemorrhage, GI symptoms not otherwise specified, hiccup, melena, mouth disorder, pharynx disorder, rectal disorder, serum gastrin increased, tongue disorder, tongue edema, ulcerative stomatitis, vomiting; ***Hearing:*** earache, tinnitus; ***Hematologic:*** anemia, anemia hypochromic, cervical lymphoadenopathy, epistaxis, leukocytosis, leukopenia, thrombo-cytopenia; ***Hepatic:*** bilirubinemia, hepatic function abnormal, SGOT increased, SGPT increased; ***Metabolic/Nutritional:*** glycosuria, hyperuricemia, hyponatremia, increased alkaline phosphatase, thirst, vitamin B12 deficiency, weight increase, weight decrease; ***Musculoskeletal:*** arthralgia, arthritis aggravated, arthropathy, cramps, fibromyalgia syndrome, hernia, polymyalgia rheumatica; ***Nervous System/Psychiatric:*** anorexia, apathy, appetite increased, confusion, depression aggravated, dizziness, hypertonia, nervousness, hypoesthesia, impotence, insomnia, migraine, migraine aggravated, paresthesia, sleep disorder, somnolence, tremor, vertigo, visual field defect; ***Reproductive:*** dysmenorrhea, menstrual disorder, vaginitis; ***Respiratory:*** asthma aggravated, coughing, dyspnea, larynx edema, pharyngitis, rhinitis, sinusitis; ***Skin and Appendages:*** acne, angioedema, dermatitis, pruritus, pruritus ani, rash, rash erythematous, rash maculo-papular, skin inflammation, sweating increased, urticaria; ***Special Senses:*** otitis media, parosmia, taste loss, taste perversion; ***Urogenital:*** abnormal urine, albuminuria, cystitis, dysuria, fungal infection, hematuria, micturition frequency, moniliasis, genital moniliasis, polyuria; ***Visual:*** conjunctivitis, vision abnormal. Endoscopic findings that were reported as adverse events include: duodenitis, esophagitis, esophageal stricture, esophageal ulceration, esophageal varices, gastric ulcer, gastritis, hernia, benign polyps or nodules, Barrett's esophagus, and mucosal discoloration. Postmarketing Reports – There have been spontaneous reports of adverse events with postmarketing use of esomeprazole. These reports have included rare cases of anaphylactic reaction. Other adverse events not observed with NEXIUM, but occurring with omeprazole can be found in the omeprazole package insert, **ADVERSE REACTIONS** section. **OVERDOSAGE** A single oral dose of esomeprazole at 510 mg/kg (about 103 times the human dose on a body surface area basis), was lethal to rats. The major signs of acute toxicity were reduced motor activity, changes in respiratory frequency, tremor, ataxia, and intermittent clonic convulsions. There have been some reports of overdosage with esomeprazole. Reports have been received of overdosage with omeprazole in humans. Doses ranged up to 2,400 mg (120 times the usual recommended clinical dose). Manifestations were variable, but included confusion, drowsiness, blurred vision, tachycardia, nausea, diaphoresis, flushing, headache, dry mouth, and other adverse reactions similar to those seen in normal clinical experience (see omeprazole package insert-**ADVERSE REACTIONS**). No specific antidote for esomeprazole is known. Since esomeprazole is extensively protein bound, it is not expected to be removed by dialysis. In the event of overdosage, treatment should be symptomatic and supportive. As with the management of any overdose, the possibility of multiple drug ingestion should be considered. For current information on treatment of any drug overdose, a certified Regional Poison Control Center should be contacted. Telephone numbers are listed in the Physicians' Desk Reference (PDR) or local telephone book.

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Not long ago, Thomas Cook was examining the strange and mysterious crop circles that had been cut into his farm in Lincolnshire, England. While trying to define the origination of these "extraterrestrial" aberrations, he made a discovery that was much more down to Earth. He discovered a hoard of Roman Empire coins in a buried earthenware pot that dated to 270 AD! It was a find of a lifetime.

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Bull's-Eye

A Smithsonian geologist helped NASA set its sites on Mars

ON SATURDAY, January 24, NASA's Mars Exploration Rover "Opportunity" hit the Red Planet's thin atmosphere at some 12,000 miles per hour, and deployed rocket thruster brakes and a parachute. Cocooned by air bags, Opportunity bounced a couple dozen times before coming to a stop. The probe had hit its target, a smooth 46-mile-long elliptical area on Mars about 75 miles south of the equator. Like its sister probe, "Spirit," which landed safely on the opposite side of the planet 21 days earlier, Opportunity immediately began sending back images of the alien landscape.

Opportunity's first color photograph. Grant (at left): "Minimum risk, maximum potential."

Compared with the technological wizardry involved in navigating across 283 million miles of space, choosing a spot to land seems far less daunting. After all, Mars' land area exceeds Earth's by 10 percent. But site selection is fraught with perils, says John Grant, 43, a geologist for the Center for Earth and Planetary Studies at the National Air and Space Museum and co-chair of the Mars Landing Site Steering Committee.

Grant's 14-member team had to take into account wind shear, craters, violent storms, deep drifts of fine Martian dust, and steep inclines, "any one of which could wreck the rovers," he says. In addition, NASA engineers warned that rocks taller than 20 inches could damage instruments inside the air bags. The perfect site would offer minimal risk for the rovers and maximum geological riches. But featureless topography ideal for landing is less than ideal for studying the planet's geology.

Right from the start in January 2001, Grant and his colleagues had narrowed the target area to 155 possible sites along a thin belt around the equator where the Sun would be strong enough to charge the rovers' solar cells. To ensure a layer of atmosphere sufficient for the crafts' parachutes to slow their descent, the team also needed a low-altitude site. By March 2002, the number was down to four. It's a matter of "how well you can know the surface and ground conditions from pictures taken in orbit," says Grant, who, as a boy, fell in love with geology walking the beaches of Lake Champlain in upstate New York.

The team's final choice for Opportunity was an equatorial plain called Meridiani. The area is covered in a dark, fine-grained material believed to contain hematite, an iron-oxide mineral that usually forms in association with water. For Spirit's site, they settled on Gusev Crater, a basin the size of Connecticut, which was created early in Mars' history by an asteroid or comet impact and may have served later as a lake bed.

NASA scientists hope the rovers will help them to determine whether liquid water existed long enough on the surface for life to emerge. As long as the rovers continue to function—Spirit's heart-rending breakdown in mid-January and NASA's efforts in reviving it have heightened the drama—this $820 million mission offers the best shot yet at answering one of science's most burning questions: Is—or was—there life on Mars? —*JOHN F. ROSS*

WHO'S COUNTING?

73

MANNEQUINS (INCLUDING THREE HORSES, TWO DOGS, ONE CAT AND A RAT) POPULATE THE NATIONAL MUSEUM OF AMERICAN HISTORY'S TRANSPORTATION EXHIBITION, "AMERICA ON THE MOVE." CRAFTING THE MODELS TOOK MORE THAN A YEAR AS THE FIGURES WERE METICULOUSLY RESEARCHED FROM TIP TO TOE—INCLUDING CRAFTING FACES FROM HEAD SHOTS SUPPLIED BY FILM AND TELEVISION ACTORS.

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A MAN, A PLAN, A CANAL: PANAMA RISES

The Central American nation, now celebrating its centennial, has come into its own since the United States ceded control of its vital waterway

BY BOB CULLEN

PHOTOGRAPHS BY BRIAN SMALE

THE FREIGHTER *Falstaff*, nine days out of San Francisco and bearing a cargo of Korean automobiles, slid slowly into a chamber of the Miraflores Locks near the Pacific end of the Panama Canal. Like her Shakespearean namesake, the *Falstaff* is broad of beam. Her sides, painted green and streaked with rust and scuff marks, rose straight from the water and towered more than 100 feet above a two-story building where the lock's controllers work. She looked blocky and top heavy, like a warehouse on water.

Four small locomotives on narrow-gauge tracks running along both sides of the lock's concrete trench slowly guided the *Falstaff* by means of steel cables fastened to her bow and stern. It was like squeezing a hippo into a bathtub. The *Falstaff* is roughly 106 feet wide. That left just two feet to spare on either side.

Massive steel gates shut behind the freighter. A system of subterranean valves and culverts that has been in operation since 1914 began letting water into the lock. No pumps are involved; the pressure of gravity suffices to raise the water level. Almost imperceptibly, the *Falstaff* began to rise.

The ship's stern glided past, and I could see a gaggle of men gathered around the tethering cables. The elaborate lockage process that so fascinated me was simply another part of a routine day to them, and they paid more attention to the lunches they were eating from white Styrofoam containers. A pelican soared lazily above the lock, heading slowly toward the green, tree-clad hills of the Panamanian isthmus. Even it looked bored.

President Teddy Roosevelt (above, in 1906 during the construction of the canal) was the man with the plan. Ships have made some 850,000 transits across Panama (right, a Pacific-bound container ship) since the canal opened in 1914.

Twenty-five years after the U.S. Senate, at the urging of President Jimmy Carter, ratified by a two-vote margin the treaty that transferred the canal to Panama, the ordinariness of the *Falstaff*'s transit struck me as a remarkable thing. During the debates, in March 1978, the Senate chamber echoed with dire fears and warnings. Although the treaty provided for a gradual, 20-year transition from American to Panamanian control, there were worries that Communists would take over the canal, or that Panama would close it or would invite in foreign forces.

Nothing of the sort has happened. Instead, Panama is running the canal at least as efficiently as the United States did. After some missteps, Panamanians are building on their American legacy—not just the canal, but the protected virgin rain forests, a railroad and long, regimented rows of cream-colored former U.S. barracks. And there's excitement about further development in eco-tourism and bio-prospecting.

Mark Falcoff, a Latin American specialist at the American Enterprise Institute in Washington, D.C., says the gamble the United States took in turning the canal over "has paid off brilliantly." In his estimation, the United States has enhanced its credentials as a good neighbor in the Western Hemisphere and avoided both the necessity of stationing a big garrison in Panama to protect the Canal Zone and the expense of upgrading the canal.

The turnover has pleased most Panamanians as well. At the Miraflores Locks, on the outskirts of Panama City (the nation's capital), lockmaster Dagoberto Del Vasto, whose job it is to notify the pilots who guide each ship through the canal when the locks are ready to receive their vessels, told me he had worked at the canal for 22 years. "I started out as a janitor," he said. "At that time, most of the lockmasters were Americans. I went to an apprentice school and graduated as an electrician. Now I supervise 20 men."

I asked how he felt about the canal and Panama's stewardship of it. He smiled. "I am very, very, very proud," he said.

Panama celebrated the centennial of its independence last November, and throughout the country a visitor could discern a sense of pride similar to Del Vasto's. Bunting hung from buildings in Panama City. Street vendors peddled Panamanian flags for drivers to mount on their cars. On Independence Day itself, church bells pealed, fireworks exploded and salsa singer Rubén Blades gave a free concert.

PANAMA, AN S-SHAPED ISTHMUS with a land area roughly equal to South Carolina's, was a province of Colombia when President Theodore Roosevelt convinced the U.S. Congress in 1902 that it made a better site than Nicaragua for the canal he wanted to construct to link the Atlantic and Pacific oceans (and thus permit the United States to more quickly project its naval power). Roosevelt chose Panama despite the costly (in francs and lives) failure of the French to build a canal across the province in the 1880s. Panama offered the shortest route between the Atlantic and the Pacific—approximately 50 miles. But much of the country is covered by thick tropical forests, and a chain of rugged mountains forms its spine. Tropical diseases, particularly yellow fever and malaria, and the difficulty of digging a sea-level channel through mountains, had defeated the French.

Roosevelt wanted to take over the remains of the French project. But Colombia would not agree to the American terms. A U.S.-supported plot was then hatched to separate Panama from Colombia. A few days before the plan was launched by a cabal of prominent Panamanian families on November 3, 1903, Roosevelt dispatched the U.S.S. *Nashville* to Panama. The gunship deterred Colombian troops from suppressing the rebellion, and the United States immediately recognized Panama as an independent country.

A few weeks after the "revolution," Roosevelt's secretary of state, John Hay, signed a treaty with Phillipe Bunau-Varilla, a Frenchman in on the plot who then got himself appointed the fledgling nation's representative to the United States. Bunau-Varilla owned otherwise worthless stock in one of the French companies involved in the earlier

MIKE REAGAN (2) P. 44 INSET: UNDERWOOD & UNDERWOOD; CORBIS

canal effort, and the treaty he negotiated enabled the company to sell its concession and property to the United States for $40 million. The treaty gave the United States control of a strip of Panamanian land ten miles wide and 50 miles long, stretching from ocean to ocean.

There, in 1914, after ten years and a cost of $352 million and 5,609 lives, the United States successfully completed the canal. The Americans had corrected two fundamental flaws in the French plan. They understood, as the French had not, that the mosquito was responsible for spreading diseases like malaria and yellow fever. By controlling mosquitoes, they made the country a more tolerable place to work. Second, they abandoned the idea of a sea-level canal. Instead, they dammed the principal river in the canal's path,

The canal's massive steel lock gates (top, at the Gatun Locks c. 1910) are 70 feet tall and weigh up to 745 tons each. Manufactured in Pittsburgh, they were so cleverly designed that a 40-horsepower motor suffices to open and close them. Numerous West Indian laborers (above) were recruited to work on the construction of the canal; more than 4,000 died.

One-third of Panama is tropical rain forest. Much of it is protected, including Soberanía National Park (above), which borders the canal. During the eight-month rainy season, the nation's rain forests store the water needed for each transit—52 million gallons per ship.

the Chagres, creating a body of water, Gatun Lake, 85 feet above sea level, then dug a channel, the Gaillard Cut, through a mountain ridge. They used the spoil from the cut to fill in lowlands along the route and built a series of three lock chambers on each end to raise incoming ships to lake level and lower them again to sea level before exiting to the ocean. From the air, the largest portion of the canal looks not like a ditch at all but a reservoir, dotted with islands and surrounded by tropical vegetation. The construction of the canal proved both an imaginative solution to a formidable engineering problem and a signal of the United States' emergence as a great power.

PANAMANIANS KNOW, of course, about the doubts expressed regarding their fitness to inherit this American triumph. I asked Alberto Alemán Zubieta, the canal's current administrator and the second Panamanian to hold the job, if he had heard from people who thought the canal would fall

Author BOB CULLEN wrote about St. Petersburg, Russia, in May 2003 and about the Camp David accords in September 2003. Photographer BRIAN SMALE is based in Seattle, Washington.

apart when Panama took over. "Oh, yeah. Many times," he said. "People used to ask me what would happen after December 31, 1999 [the date the transfer was completed]. My answer was January 1, 2000. *Nothing* was going to happen."

One reason for the smooth transfer was that Panama had, over the years, developed a cadre of American-trained specialists. Alemán Zubieta, whose ancestors were among the founding families of Panama back in 1903, is one of them. He got his higher education at Texas A&M, earning degrees in both civil and industrial engineering, and he is a man who could be as thoroughly at home in Houston as he is in Panama. He drives a BMW X-5, and he plays golf to a single-digit handicap.

We talked, in fact, on a golf course near the Continental Divide, not far from a cemetery that contains the mossy tombstones of Frenchmen who died attempting to build the canal. It is off a potholed road near the Trans-Isthmian Highway that links Panama City, on the Pacific, to Colón, on the Atlantic. Along the road, exhaust-spewing trucks rumble through villages of concrete homes painted in pastel shades of green and yellow. Young girls in plaid skirts walk to and from school. Egrets can sometimes be seen flying over the highway.

The golf course was built in the 1940s and 1950s for canal personnel. It has recently been refurbished by a Panamanian businessman and opened for public play. It's a hilly course with holes bounded by tropical forests and head-high elephant grass. Howler monkeys could be heard in the trees as we played our shots. Alemán Zubieta said that when he was a boy, the only way he could play this course was to pretend he was a caddie and participate in an occasional caddies' tournament. When I asked him how the canal was doing, he rattled off statistics like a salesman giving a presentation: "One measure of quality is the average time, including waits at the entry points, that a ship needs to make the crossing," he said. "In 1996-97, we were about 32 hours on average. Today we are below 24."

Panama City, the country's capital, is a fast-growing metropolis situated along a wide bay of the Pacific. The city's elite Punta Paitilla area (above) is home to its wealthier citizens and is crowded with high-rise condominiums, apartments and expensive stores.

The canal operated in both 2001 and 2002 with only 17 accidents per year in a total of more than 26,000 transits—the best safety record in its history. In the four years since the turnover, total employment has gone from more than 10,000 workers to between 8,000 and 9,000, with claims of greater efficiency.

Panamanians have installed computerized navigational and tracking devices that enable canal officials to follow every vessel in the canal. They have also accelerated the pace of maintenance in the Gaillard Cut, which requires constant dredging because the soil on either side is unstable and prone to mud and rock slides, especially during the long rainy season. The dredging has widened the cut by some 120 to 200 feet since the treaties were signed a hundred years ago. Panama expects to be able to allow 24-hour two-way traffic in the cut soon, even with vessels the size of the *Falstaff*. (At present, the biggest ships transit at different times. Atlantic-bound traffic might go through the cut in the morning, Pacific-bound traffic in the afternoon.) On top of all that, Alemán Zubieta told me, the canal has managed to double the annual payment it makes to the government of Panama from $135 million in 1999 to $270 million in 2002.

But the canal is not a spigot that spits out money. The Panamanians are, in Alemán Zubieta's words, "constrained by the market." Tolls have been raised four times since the turnover (the *Falstaff* paid more than $143,000 for its transit), but if tolls get too high, shippers might choose to go through the Suez Canal or unload containers on either coast of the United States and ship them onward by rail. Thus, if Panama wishes to grow its economy, it must look beyond the canal.

As if to underscore the point as I spoke with Alemán Zubieta on the golf course, a train chugged by on the Panama Canal Railway, pulling open carriages, each laden with two truck-size containers. Completed in 1855, it once shuttled prospectors en route to the California gold fields across the isthmus. More recently it has proved a training ground for Panamanians in managing assets transferred by the United States. Their record after the 1979 takeover was not encouraging. The railroad became a fiefdom of the military, which at that time controlled the country. (Strongman Manuel Noriega, who was removed by American troops in 1989, was convicted in 1992 of six counts of racketeering, drug trafficking and money laundering. He is currently serving a 40-year sentence in a federal prison in Miami.) Track and rolling stock deteriorated for lack of main-

tenance, and the payroll was bloated with politically connected employees who did little more than collect checks. By the 1990s, the railroad was unsafe, ran few trains and required millions of dollars a year in government subsidies.

In 1998, the Panamanians tried another approach—privatization and foreign management. The government granted a 50-year concession to operate the railroad to a joint venture created by the Kansas City Southern Railroad and Mi-Jack, an Illinois company that manufactures freight-handling equipment. The new venture has rebuilt tracks, renewed rolling stock and improved freight carriage. Recently it bought and refurbished six passenger cars, including a glass-roofed 1938 Southern Pacific observation car, which had been serving as an ice-cream parlor in Jacksonville, Florida. The observation car now has air-conditioning, mahogany paneling, leather seats and wall-to-wall carpeting.

The passenger train, which leaves Panama City at 7:15 a.m., permits passengers to see a cross section of the country. Pulling out of the station, you can see remnants of the old Canal Zone, row after row of precisely positioned buildings, formerly used as offices and barracks. They are now given over to a variety of uses, but still testify to the American military culture that built them. Next comes a district of blocky, concrete structures with patchy lawns and low palm trees. Once housing for American administrators and technicians, they are now sold on the open market for about $100,000. A few minutes later, the train slips into a rain forest. Trees crowd the tracks. Heron take flight over algal ponds. Gatun Lake appears on the western side of the track, freighters churning through it. Within an hour, the train enters Colón, the country's chief Atlantic port. Laundry flaps from clotheslines and paint peels in trackside neighborhoods. The only thing gleaming in Colón is the sweat on the backs of its inhabitants.

Some of the buildings in the old U.S.-run Panama Canal Zone at the Fort Clayton military base (now known as the Ciudad del Saber, or City of Knowledge) have been made into offices for companies doing research in tropical diseases and bio-prospecting.

Privatization, accompanied by foreign management, has had an impact not just on the railroad but on other key sectors of Panama's economy in the six years since concessions were given out. Major ports on both the Atlantic and Pacific sides of the canal are run now by Hutchison-Whampoa, Ltd., a Hong Kong firm. The Panamanian government has sold its electrical utilities to several foreign-owned companies and 49 percent of its telephone company to Britain's Cable & Wireless.

If there are Panamanians who see this as colonialism via the backdoor, I met very few of them. "The model chosen to open the railroad to private investment and to bring in the most efficient technology has proved to be the right one, and it's already paying dividends to the Panamanian economy," says Juan Carlos Navarro, the mayor of Panama City, who has degrees from both Dartmouth and Harvard.

The Panamanians I met were less concerned with colonialism than with making a living in a poor country under the auspices of a government plagued by corruption. I dropped in one afternoon on a boxing gymnasium in Curundu, a neighborhood in Panama City filled with grim, concrete tenements. The gym is a humid place with a tin roof, concrete walls painted a fading blue, and a concrete floor.

A bright brass plaque on the outer wall says the gym was named for Pedro "El Roquero" Alcazár, a local boy who had trained here and was the 20th Panamanian boxer to hold a world championship. Alcazár won a World Boxing Organization championship in 2001 and held it until June 2002, when, in Las Vegas, a Mexican fighter named Fernando Montiel pounded Alcazár's body and head until the fight was stopped in the sixth round. Two days later, Alcazár collapsed and died of brain swelling.

"He left five children by five different women," Franklin Bedoya, a volunteer coach at the gym, told me. "None of them has seen any of his purse. It's been held up by some sort of investigation."

Around us, young men were hitting heavy bags, sparring, skipping rope. Panamanian fighters tend to be from the lower weight, as well as the lower socioeconomic, classes. Their bodies are pared to bone, muscle, and skin the color of coffee, from mocha to black.

When I asked Bedoya what motivated young men to follow El Roquero's path, he summoned a young fighter named José Mena. José is 15 years old, weighs 108 pounds and has already had 36 amateur fights. "I want to be a professional when I turn 18 so I can get my mother and my sister out of this neighborhood," he told me. "It's dangerous. Sometimes the gangs here have trouble and shoot at one another."

And bystanders can get hurt?

He nodded, then showed me the jab, hook and uppercut combination he hopes will be his ticket out.

The odds against that, of course, are long. I talked to another, slightly older boxer named Jairo Arango. He was short, slightly built, with a scarred left eyebrow that marred an incongruously soft and boyish face. He had occasionally been a sparring partner for Pedro Alcazár, and he had gotten almost to the pinnacle in the 105-pound division. He'd had a shot at the title bout, fighting champion Jorge Mata in Mata's home country of Spain, but lost the decision. He held two fingers less than an inch apart to show me how close he'd come to being champion of the world.

I asked him how much he'd cleared from that fight.

"Six thousand dollars," he replied. It was enough to buy some furniture for his wife and daughter. It was not enough to get out of Curundu.

From Curundu, Arango could see the wealthier parts of Panama City. The capital is compact, spread along the shore of a broad bay of the Pacific. From almost anywhere in the area, a person can see the glass-and-marble towers of the banking district and the gleaming, high-rise condominiums of Punta Paitilla, where the wealthy live. In between Curundu and Punta Paitilla there are narrow, crowded streets full of traffic and American fast-food restaurants; markets where the poor can buy plastic shoes for about a dollar; storefront Protestant churches and graceful Catholic cathedrals; squat houses with sagging shutters and newer projects with paint peeling from their concrete facades.

But in Punta Paitilla, boutiques sell the best Italian shoes and the cars on the streets tend to be sedans from Germany and SUVs from Japan and the United States. Security guards protect the entrances to the condominium towers.

Many young Panamanian men (above, Simón Arrocha, an aspiring contender, at El Roquero gymnasium) view boxing as a way out of poverty. The gym was named for Pedro "El Roquero" Alcazár, a Panamanian world champion who died after a 2002 fight.

PUNTA PAITILLA'S UNION CLUB was founded by and for Panama's *rabiblancos*. The name means, literally, "white tails," and it is a reference to skin color, the traditional elite of the country being descended from the old Spanish gentry. The club has diversified its membership somewhat in recent years, admitting a few Jews and a handful of darker faces. But the membership is still overwhelmingly white and Christian.

The club occupies a modern stucco building on a low bluff overlooking the bay. When members drive up under the porte-cochere, they face an open lobby that affords a view of surf breaking on the rocks below and, in the distance, ships waiting to enter the canal. It is an elegant setting for business lunches, wedding receptions and family meals on Sundays, when Panama's maids and cooks have the day off. I dined there with a Panamanian businessman on white damask tablecloths embossed with the club seal. Through the windows we could see children frolicking in the club pool.

My host, who preferred not to be identified by name, makes his living in part as a consultant to companies doing business in Panama's *zona libre*, or free trade zone, which is in Colón. Merchants in the zone, an enormous, enclosed district of storefronts and warehouses, may import goods without paying duty as long as the goods are reexported to another country. There are no retail sales in the zone. The customers are themselves retailers, mostly from the Caribbean and Latin America. It's the place to go if you are, say, a small Peruvian electronics dealer looking to purchase a stock of Japanese computers and television sets.

One of the services my host provides, he said, is the off-the-shelf shell corporation, fully registered for business in Panama. A client can buy it from him for $20,000 and put it to whatever use he pleases, including establishing a business in the zona libre. Sometimes, he says, a client will balk and say that $20,000 is too much to pay for what amounts to a folder full of paperwork.

"I explain to the client that he can indeed establish his own corporation and get it licensed to do business," my host told me. He paused to order a white wine and an orange juice from a waiter in black tie. "But he will find that he needs the signatures of 36 different bureaucrats to accomplish this. And then he will find that each of these bureaucrats happens to be 'on vacation' when he needs his paper signed, and only for the inducement of, say, a month's salary, can the man be persuaded to return to the office and sign."

The waiter returned, and my host mixed the wine and orange juice together.

"Eventually, most of them realize that the most efficient

way to do business is to buy the shell corporation," he said. He shrugged, almost apologetically.

The cynicism in that shrug seems to permeate all classes in Panama. In an indoor shopping mall one morning, I spoke to Carmen Sota, a tall, dark-skinned woman wearing a shirt emblazoned with a popular American export, the yellow smiley face. The mall, which featured a range of goods from clothing to housewares at low prices, could have been transplanted from any typical American city.

Her husband, Soto said, is an auto mechanic whose income ranges from $600 to $800 per month—a middle-class wage in Panama, where the per capita annual income is about $6,000. She herself used to work in a plant that stamps designs on shirts, but she quit when she decided her 13-year-old son needed her at home. The family had tightened its belt, selling a car. She'd come to the mall to buy jeans for her son.

"The politicians here are insincere and dishonest," she said. "They promise things like roads when they're campaigning, but then they don't do anything. They forget about the people when they are elected.

"I don't vote," she added.

"We're in the process of learning to be a country," Victoria Figge told me one morning. She works for a company that specializes in fraud prevention and analyzes risk for potential foreign investors. "We are learning how to be dependent on ourselves. Don't forget that even though we're celebrating our centennial, we've really only been independent for a few years, since the last American troops left."

I did hear words of cautious optimism from some quarters in Panama, particularly those involved with the country's enormous natural bounty. As Panama seeks to diversify and improve its economy, it is looking to use the resources of its rain forests and parks and develop ecotourism. I got a glimpse of its potential one morning at a hotel called the Canopy Tower, about 20 miles outside of Panama City in a national park called Soberanía (Sovereignty). The structure is a corrugated metal cylinder 50 feet high, painted aqua, with a yellow fiberglass sphere that looks a little like a soccer ball perched atop it. It began life as an American military radar station, on a ridge called Semaphore Hill. In the last years of the American military presence, it tracked drug runners' planes coming from Colombia.

A former U.S. military radar station, the Canopy Tower hotel in Soberanía National Park is a mecca for bird lovers. Panama's warm climate, beaches and abundant animal and plant life (there are 940 recorded bird species) attract growing numbers of eco-tourists.

When the Americans left, a Panamanian businessman and birding enthusiast named Raúl Arias de Para acquired the rights to manage the property and set about beating the American sword into a plowshare. He installed a dozen wedge-shaped bedrooms inside the cylinder. On the top level, he built a casually elegant lounge and dining area encircled by windows. Atop that, wedged under the yellow soccer ball, he built an observation deck with a 360-degree view of the surrounding rain forest and, in the distance, the canal.

The beauty of this is that it allows guests to see the birds face to face. Near dawn on the day I visited, I climbed through a hatch to the observation deck to watch and listen as the forest awakened. A staff member provided fresh coffee. Howler monkeys bellowed somewhere to the north. Mist floated over the forested hilltops of the Continental Divide. The sun came up from the general direction of the Pacific. (Because of the way the isthmus lies, the Pacific end of the canal is southeast of the Atlantic end.)

Using binoculars and the naked eye, the guests around me began to spot birds. Some 15 yards away a pair of keel-billed toucans preened. They were green, yellow, carmine, aqua and orange—and those were just the colors in their enormous beaks. (They are the colors, not coincidentally, that Arias de Para's decorator chose for the hotel.) To the east, a pair of green parrots flew over the treetops. Farther in the distance someone pointed out a blue *cotinga*, its feathers the intense color of a flame. The cotinga seemed to be watching us watching him.

Arias de Para and his guests have logged roughly 300 different species around the hotel in the five years since he opened it. After breakfast, he and the cheerful guides on his staff take the guests out in search of still more species to add to their life lists, advising them first to smack a sock filled with powdered sulfur around their ankles; the yellow dust repels some of the forest's less appealing species, such as chiggers.

This is the sort of tourism that Panamanian environmentalists hope to develop. They would like to avoid the Cancunization of their country's beaches and forests. They would prefer a network of small lodges with very light footprints, catering to tourists who want to see Panama's birds, reefs,

The country's remarkable biodiversity is due to its position as a narrow land bridge between two continents and to the large size of its wilderness areas. Clockwise from top left: a leaf-cutter ant, a keel-billed toucan, a howler monkey and a huge marine toad.

rain forests and national parks without destroying them.

Their vision is possible in part because of an accidental American legacy. The United States permitted very little development in the former Canal Zone, though not because it cared about eco-tourism. The canal requires huge amounts of fresh water. Every large ship that makes a transit requires 52 million gallons from Gatun Lake—26 million to raise it and 26 million to lower it. That water is flushed away into the sea. A virgin rain forest was therefore good for canal operations. It soaked up water in the rainy season (the Atlantic half of the isthmus alone gets about 120 inches of rain in an average year) and released it slowly during the four-month dry season. So, compared with those in some other tropical countries, Panama's rain forests have been well preserved. In addition to hundreds of species of birds, they harbor an impressive variety of flora and wildlife, from orchids to ocelots.

"Fifteen percent of Panama's territory is in national parks," I was told by Lider Sucre, director of the National Association for the Conservation of Nature, Panama's leading environmental organization. This, according to the World Resources Institute, makes Panama's biosphere one

of the world's most extensively protected. It is roughly five times the percentage of national territory devoted to parks in the United States.

Tourism is only one way Panama hopes to capitalize on its rain forests. There is also bio-prospecting. I got a look at this enterprise on a visit to the Smithsonian Tropical Research Institute (see "World View," page 14), or STRI, which is located on an island called Barro Colorado in Gatun Lake. Since 1923, scientists at STRI have been studying the ecology of rain forests.

Research biologist Joe Wright showed me around the island. A rain forest at ground level looks and smells much different than it does at canopy level. On the ground, it is dark and shadowy. The air is humid, thick. Insects are seen more often than birds.

Wright pointed out a line of large, red leaf-cutter ants making their way toward their nest. Each ant had a bit of leaf perhaps half again its size clenched in its jaws. These ants, he said, have played a part in bio-prospecting.

Leaf-cutter ants are farmers of a sort. Foraging members of the colony march about the rain forest in long lines, cutting pieces of vegetation from a variety of plants and carrying them back to the nest. In the nest, other ants chew the leaf bits into pulp. The masticated leaf material is packed into an underground chamber about the size of a football. This pulp becomes a field on which a fungus grows. The ants feed on the fungus.

A biologist named Stephen Hubbell, who worked on Barro Colorado in the mid-1980s, began a study of the plants that leaf-cutter ants selected—and did not select—for their farming needs.

Electric towing locomotives guide the *Astral Ace* through the Pedro Miguel Locks. Says lockmaster Dagoberto Del Vasto, who began as a janitor and has worked at the canal for 22 years, of Panama's four-year stewardship of it: "I am very, very, very proud."

Hubbell enlisted a young biologist named Jerome Howard and a chemist named David Wiemer in the work, which was conducted partly on Barro Colorado and partly in Costa Rica.

They found that among the trees leaf-cutter ants avoided was one called *Hymenaea courbaril*. The team performed a series of tests on extracts from its leaves, observing which extracts the ants avoided. Eventually, they isolated some 70 compounds with potential antifungal applications, though none, thus far, has proved commercially viable.

The lab work that led to the discovery of these compounds was carried out at the University of Iowa, not in Panama. Panama's challenge in the post-American era is to make certain that intellectual products from its rain forests create jobs and wealth for Panamanians.

The country now participates in a program called International Cooperative Biodiversity Groups (ICBG). Its goal is to develop new drugs and pharmaceuticals from molecular compounds discovered in Panamanian rain forests, doing the research—from specimen gathering to lab analysis—in Panama. Some of that work is done in what was an American military base—Fort Clayton. The base is now known as Ciudad del Saber, the City of Knowledge, and several of its old buildings have been refurbished as laboratories, where researchers are looking for compounds to use against HIV and tropical diseases.

There are promising signs. Using a biological assay technique developed in Panama, an ICBG researcher in Puerto Rico recently reported isolating compounds in the Caribbean gorgonian coral that are active against the parasites that cause malaria.

It makes for an interesting neighborhood. Ciudad del Saber is very near the canal and the Miraflores Locks. In a short time, it's possible to walk from what may be a source of future marvels to a source of marvel in 1914.

I made that walk when I watched the *Falstaff* on its canal transit. The canal may no longer be as strategically vital as it was when it first opened. There are vessels, both naval and commercial, that are too big for its locks, and Panama will have to decide soon whether to try to expand the canal with a new, much larger set of locks. Expansion could be fraught with unforeseen consequences, both to the country's treasury and to its environment. But even in its present form, the canal is still an impressive testament to the politicians who conceived it, to the engineers and laborers who built it, and to the Panamanians who run it today.

The *Falstaff* spent 13 minutes rising 27 feet in the lock. A bell rang. Gates at the far end of the lock swung open. The water under her fantail began to froth as its propeller churned. Slowly, the ship moved out toward the Atlantic. She was bound for Brunswick, Georgia. She was scheduled to arrive in four days. ○

The glacier-carved freshwater fjord at Western Brook Pond.

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KENYON'S AGELESS QUEST

A San Francisco scientist's genetic research renews the ancient hope for a way to slow aging – BY STEPHEN S. HALL

THE POSTER TAPED TO THE DOOR of Cynthia Kenyon's office at the University of California at San Francisco seems so ordinary that you would hardly suspect it advertises a revolution in human affairs. It announces a talk she was about to give on genes that influence the life span of a type of nematode, a tiny worm that lives in soil. The poster shows a cartoonish illustration of a wizened little worm hobbling along with the help of a cane, while half a dozen human infants, in diapers, splash in the spray of a fountain. Despite the whimsical drawing and the mischievous title of Kenyon's lecture, "Genes from the Fountain of Youth," she's not kidding. Since the early 1990s, Kenyon, a molecular biologist, has produced a body of research about this simple organism that has broad implications. She and her collaborators have doubled, quadrupled, and in some instances sextupled the worm's life span by manipulating several of its genes. And others have found that the same metabolic pathway, controlled by genes, appears to function in other organisms, including yeast, fruit flies and mice. The question is whether

Searching for longevity genes, Cynthia Kenyon (right, with a digital image of a nematode) has invoked Ponce de León's 1513 quest for the fountain of youth (left), even though it failed.

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it also functions in people—and might be manipulated to extend human life.

Many scientists say no, but Kenyon is betting on yes. Four years ago, she co-founded a biotechnology company, Elixir Pharmaceuticals, in Cambridge, Massachusetts, to develop drugs and other products to treat age-related diseases and slow down the process of aging. Another company co-founder, Leonard Guarente, an MIT biologist and an old friend of Kenyon's, has suggested that the company might, within a decade, develop a pill that could add 10 to 30 years to a person's life. "We may not have a perfect drug in 10 years, but we'll have something to build on," says Kenyon, 50. "Potentially, we could have it sooner."

Elixir is one of about a dozen small biotechnology companies jumping into the fountain-of-youth business. Only a decade or so ago, the pool was pretty empty, unless you counted the pseudoscientists and snake-oil salesmen who have historically hawked anti-aging nostrums. But genuine advances in genetics and the study of stem cells, unspecialized cells that can be coaxed to develop particular functions and thus might replace damaged tissues, have engendered new ways of thinking. "The thing about aging," Kenyon says, "was that everybody thought, 'Well, you know, the animal just breaks down, and what's to study, really? It's not going to be very interesting.' But when I looked at it, I could see that different animals have different life spans." Consider a mouse, a canary and a bat. "The mouse lives two years and the bat can live 50 years and the canary lives about 15 or so years. They're all small animals. They're warmblooded. And they're not that different, really, in such a fundamental way from each other." A fairly small number of genes, she argues, may control the creatures' differing life spans.

To a lot of biologists, aging research has not always been a respectable calling. When Kenyon's lab first began to work in the field, she insisted that her co-workers avoid even using the "a-word" in research reports and grant applications. "It was embarrassing to say we were working on aging," she says. "The field had a reputation for going nowhere." To be sure, life extension is still subject to wild exaggeration and implausible predictions, but the field has progressed tremendously, and Kenyon's research has had a lot to do with that. "The field needed an injection of fantastic talent, people like Kenyon and Guarente," says Gordon Lithgow, a molecular biologist at the Buck Institute for age research in Novato, California. "They're great communicators, but they're also just the tip of the iceberg. There's some great science coming out of this area."

The marriage of molecular genetics, our most precise and vaunted life science, with perhaps the oldest and most alluring human fantasy—eternal youth—is one of the most intriguing aspects of recent gerontological research. Given the moral embedded in the misfortune of Tithonus—the sad

Guarente (left, with Perls at the Cambridge, Massachusetts, biotech firm Elixir) says it's possible that, within a decade, the company could develop a pill that will add years to human life.

"The process of aging influences our poetry, our lifestyle,

sack of Greek mythology whose wife mistakenly asked the gods for eternal life for him instead of eternal youth, causing him to wind up in an endless purgatory of decrepitude—the myth of a fountain of youth has been part of the record of human longing for at least two millennia.

If Tithonus gave that longing a cautionary quality, ancient cultures, notably the Egyptians and Chinese, gave it an aura of quackery, at least to modern eyes. More than 2,000 years ago, Chinese alchemists known as "thaumaturgists" devoted considerable energy to creating "drinkable gold" as a means of prolonging life. "The king of the state of Chu was presented with an 'elixir of deathlessness' by thaumaturgical technicians," notes a Chinese text of around 400 B.C. (which did not, however, reveal if the potion worked). Gerald J. Gruman, a historian who has surveyed life extension, writes that "interest in the fountain of youth had reached an apex in the fourteenth and fifteenth centuries, and the discovery of America gave a new impetus to the tradition in the early years of the sixteenth century."

It was Juan Ponce de León, of course, who put a more

STEPHEN S. HALL, a Brooklyn-based science writer, last wrote for these pages about the West Nile virus, in the July 2003 issue.

JASON GROW

modern face on the myth and gave it an enduring ethos of futility. Legend has it that, around 1509, while serving as governor of what is now Puerto Rico, he first heard tales about a fountain or spring on Bimini, an island to the northwest, that rejuvenated anyone who drank from it. Intrigued perhaps more by reports of gold than rejuvenating waters, Ponce de León mounted an expedition in March 1513. He failed to find either Bimini or the "Fountain of Youth," but within a month or so did discover Florida.

The search for youthful immortality took a notably pseudoscientific turn in 1889, when the respected French scientist Charles-Edouard Brown-Sequard claimed he could rejuvenate old men with an injection containing crushed dog testicles. Though the claim was mistaken, it incited scientific races in the early 20th century to isolate the male hormone testosterone and the female hormone estrogen, which have long been promoted by physicians and charlatans alike as anti-aging tonics.

On Kenyon's office bookshelf, Lewis Carroll's *Alice's Adventures in Wonderland* and Edgar Allan Poe's *Tales of Mystery and Imagination* sit alongside James D. Watson's *The Molecular*

Humanity's longing for immortality is embodied in the Greek legend of Tithonus (right), condemned by Zeus to eternal life, but not youth, and finally turned into a grasshopper. Today, biologists seek clues to aging in the tiny *C. elegans* worm (below, magnified 110 times, with eggs in blue), which has a mere 959 body cells, simplifying the study of genes in action.

and our happiness, yet we know surprisingly little about it."

Biology of the Gene, a combination that hints not only at the breadth of Kenyon's interests but the way they straddle popular culture and hard-core science. Even her scientific papers are accessible. "The process of aging influences our poetry, our art, our lifestyle, and our happiness, yet we know surprisingly little about it," she writes in the data-thick, jargon-strewn journal *Cell*.

Born in Chicago and raised in Georgia, New York, New Jersey and Connecticut, Kenyon attended the University of Georgia, where her father was a member of the geography faculty and her mother worked as an administrator in the physics department. Cynthia Kenyon traces her passion for genetics to the day her mother brought home Watson's *The Molecular Biology of the Gene*, which taught her, she recalls, "about switching on and off genes in bacteria. I just thought it was fabulous." After graduating as class valedictorian in 1976 with a degree in biochemistry, Kenyon moved on to MIT, where she got her PhD. She then spent five years at Cambridge University in England, where she was tutored in the ways of one of the lowliest and yet most astonishingly instructive creatures to crawl out of the ground: the nematode.

At Cambridge, she trained as a developmental biologist under Sydney Brenner, who received a share of the 2002 Nobel Prize in Physiology or Medicine for work showing how genes dictate the development of organs and tell some cells when to die, as though they'd been preprogrammed to self-destruct at a particular time. Brenner had long championed the virtues of experiments with the nematode *C. elegans*. The translucent smooth worms, barely the size of the comma at the end of this phrase, are in constant motion; viewed

under a microscope, they carve sinuous arabesques across the gel on which they're grown in the lab. To scientists, the worm provides a remarkably revealing model of genetics in action. *C. elegans* has a three-day cycle from birth to laying eggs and lives a little more than two weeks. It possesses a relatively modest 19,000 genes, and has the added benefit that its body's 959 cells are virtually transparent when viewed through a microscope—enabling scientists to literally peer into the worm's parts as it develops, whether naturally or in response to an experiment. Soon Kenyon became part of an army of researchers who, through sophisticated experiments, could show genes being activated in distinct patterns. Those tests yielded important clues about which genes controlled specific steps in the worm's growth, development and aging.

She learned not only the exquisitely sensitive genetic choreography of developing organisms, but also that when it comes to genes, evolution keeps going back to the same well: the genes that control the development of nematodes and frogs and mice also tend to control human development (albeit in slightly more complicated ways). Similarly, Kenyon theorized that aging in nematodes and people might also be controlled by comparable genes. Moving to the University of California at San Francisco in 1986, and aware of the work of Tom Johnson, a University of Colorado biologist who had studied a nematode that lived longer than usual, Kenyon and her co-workers looked for genes that, when altered in particular worms, made those worms live longer than others. She found that changing one specific gene, called *daf-2*, doubled the animal's life span and also prolonged its youthful activity. Another scientist, Gary Ruvkun of Harvard Medical School, discovered that the genes in question regulated a hormone-signaling system in the worm that is surprisingly similar to the way the human body signals the need for both the hormone insulin, which spurs the breakdown of sugar, and an insulin-like growth factor (IGF-1), which affects physical growth. Flouting the scientific tradition of understating one's findings, Kenyon began to talk about the "fountain of youth gene," an idea, as she recalls it, that people thought was "kind of cute."

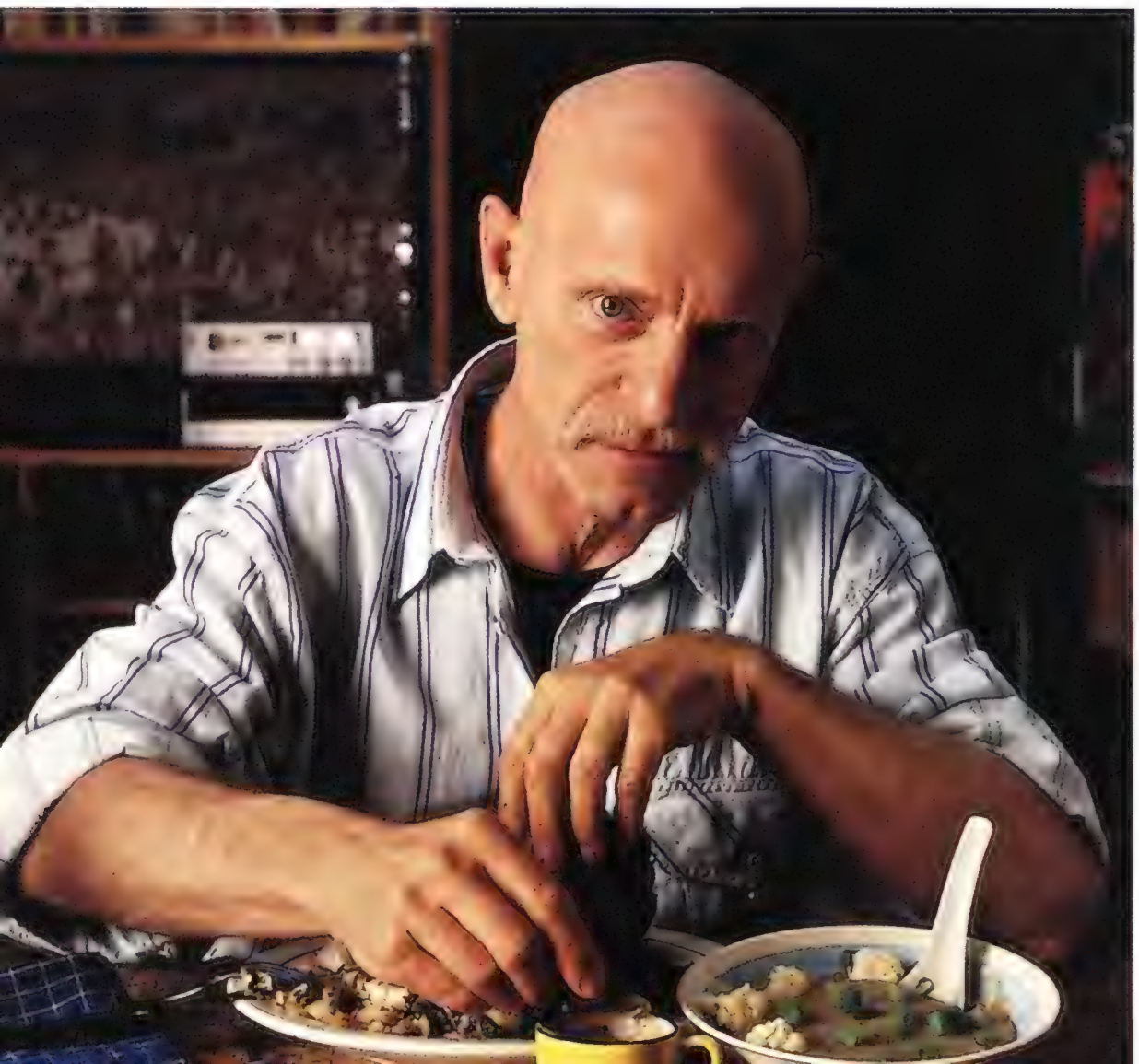
As Kenyon and co-workers delved into the problem, they learned more about the insulin-signaling pathway, showing that when certain worm hormones were suppressed, it activated a host of other genes that appeared to play a role in extending the animal's life. So the question became: Did evolution favor this mechanism and pass it along to other organisms? "Is it in humans?" Kenyon asks. "We don't know." Still, she and other scientists have what they believe are promising leads—thus the work at Elixir and other biotech firms to identify human versions of the same life-extending genes found in simpler creatures.

One of Kenyon's buddies from her Cambridge, Massachusetts, days was Guarente, a meticulous and somewhat reticent molecular biologist. He has studied important but esoteric aspects of gene regulation for 20 years. In the mid-1990s, his research group discovered a family of specialized genes that influence the life span of yeast cells. Called silencing genes, their job is to make proteins that smother, or silence, other genes, usually in response to changing environmental conditions. When the MIT biologists genetically engineered yeast to have an extra copy of one such gene, called *sir-2*, the yeast cells lived longer. As important as the function of the *sir-2* gene—it directs the making of an enzyme—is that the gene is activated when food intake and metabolism are reduced. In short, the silencing gene linked the high-tech molecular manipulations of life extension in yeast to a low-tech life-extension strategy that had been known for decades in rats: a starvation diet.

In a classic set of experiments in the

Inspired by research showing that some lab animals eating the minimum survive the maximum, 79-year-old Walford (in 2003) and others restrict caloric intake to prolong their lives.

People thought that the idea was "kind of cute."



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"It's kind of romantic that red wine contains something that

1930s by Clive McCay at Cornell University, rats fed just enough food to fulfill the animals' nutritional needs but not enough to maintain their usual weight lived about 20 to 40 percent longer than rats raised on a normal amount of food; some lived twice as long. More than half a century later, caloric restriction remains the only proven strategy of life extension other than gene engineering. It has been demonstrated to work not only in rodents but also in yeast, fruit flies, spiders and fish, and, in continuing studies sponsored by the National Institute on Aging, it appears to have a similar effect in monkeys.

The link between diet and longevity has intrigued fanatics as well as researchers. A professor emeritus of pathology at UCLA and a member of the 1991-1993 Biosphere 2 experiment, Roy Walford, 79, has undertaken a much-publicized experiment on himself—for years he has eaten a nutrient-rich diet of just 1,600 calories a day in the hopes of extending his life. (His research is now complicated by his own amyotrophic lateral sclerosis, or Lou Gehrig's disease.) Likewise, according to the *Wall Street Journal*, hundreds of Walford disciples are restricting themselves to as few as 1,500 calories a day in hopes of living longer.

Guarente, following up on his group's discovery of a life-

"There are no death or aging genes," says a skeptical Olshansky (right, with Bruce Carnes, mocking the anti-aging industry last year with awards modeled on patent medicines).

extending *sir-2* gene in yeast, a single-celled organism, has more recently shown that the more complex nematodes possess an analogous gene that can also prolong life. In fact, the researchers showed that endowing nematodes with an extra copy of that gene prompted the worms to live nearly 50 percent longer than usual. In any event, human beings possess versions of both the *daf-2* and *sir-2* genes, which is what tantalizes researchers, biotech investors—and consumers.

Around 1996, Kenyon began showing, to venture capitalists, a five-minute film dramatizing the difference between geezer and genetically rejuvenated nematodes. "I show them the movie, of worms that are normal that are about to die after two weeks, and the altered worms that are still moving," Kenyon said. "They see it with their eyes, you know? . . . And that's really all you have to do. It speaks for itself." In December 2000, Kenyon and Guarente started Elixir with the ultimate hope of selling a product—ideally, a small molecule that could be packaged as a pill—that would extend life span and prolong youthfulness by affecting the *sir-2* gene,

CHARLES BENNETT AP WIDE WORLD PHOTOS

among other parts of the insulin-signaling system. Last year, Elixir merged with Centagenetix, another Cambridge-based biotech firm, which has been scouring the chromosomes of centenarians and other very old people for genes that may have contributed to their long lives.

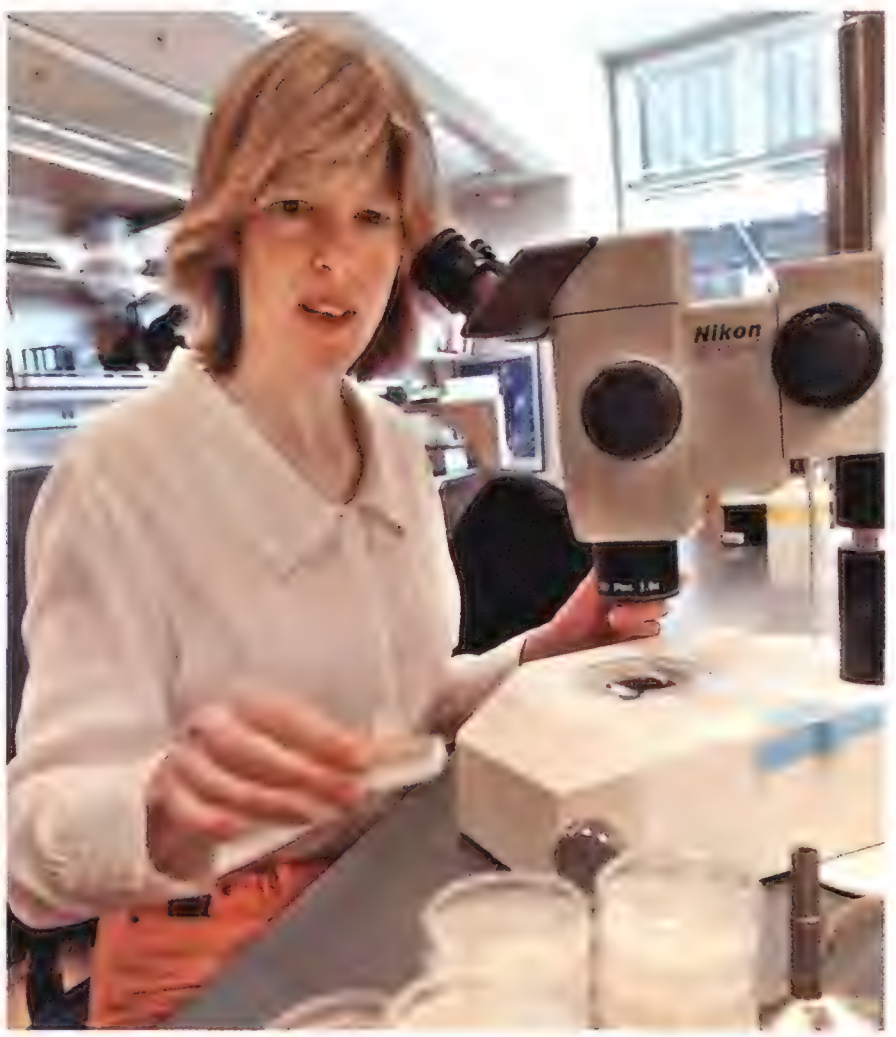
Even before the yeast and nematode research, scientists suspected that genes play a role in determining life span. More than 50 gene mutations affecting it have been identified in various animals. A group headed by Thomas Perls, of the Boston University School of Medicine and one of the cofounders of Centagenetix, has investigated many centenarians in New England and beyond, and this past November he reported that a gene on chromosome 4 appears related to life span. (People who lived to 100 were more likely to have a particular version of the gene that produces a protein that plays a role in processing fat.)

Such findings dovetail with Kenyon and Guarente's approach. "When single genes are changed, animals that should be old stay young," they wrote recently. "In humans, these mutants would be analogous to a ninety year old who looks and feels forty-five. On this basis we begin to think of aging as a disease that can be cured, or at least postponed."

But skeptics say that extending life span through genetic manipulation is not inevitable. The distinguished gerontologist Leonard Hayflick, a pioneer in the study of aging cells, says he doubts that lives can be significantly prolonged by genetic tinkering and has famously stated that eradicating cancer, heart disease, diabetes and other principal causes of death would add, at most, about 15 years to average life expectancy. S. Jay Olshansky, a biodemographer at the University of Illinois at Chicago, applauds the work on nematode aging but questions its relevance to people. Human life span, he suggested at a recent scientific meeting, is not a simple matter of genetics: "There are no death or aging genes—period." He bases his assertion on evolutionary reasoning, arguing that natural selection operates primarily on traits that affect an organism's ability to reproduce; accordingly, one would not expect evolution to favor genes that extend an organism's life much beyond its reproductive years. In fact, Olshansky has warned that trying to extend human life by manipulating genes could have "unintended and unwanted consequences," such as an extremely old person who is physically fit but cognitively impaired.

Every month, however, it seems a new research report adds credence to the notion that the fundamental ravages of aging might at least be blunted by exploiting the biochemical pathways discovered by Kenyon and Guarente. This past August, Harvard Medical School researcher David Sinclair and colleagues reported that several common organic molecules—including resveratrol, an ingredient in red wine—activate *sir*-like proteins in human cells and extend the life span of laboratory yeast. Those findings have bolstered the observation that people who drink moderate amounts of alcohol, including wine, appear to live longer than those who abstain. Sinclair, a former post-doctoral fellow in Guarente's MIT lab, has said he plans to set up his own company to develop a drug that acts like resveratrol. Says Kenyon: "It's kind of romantic that red wine contains something that could extend your longevity, don't you think?"

"I have really been struck in my life by how unimaginative scientists tend to be," says Kenyon (in her San Francisco lab), who flouts tradition with bold, controversial genetic theories. could extend your longevity, don't you think?" Kenyon asks.



BY MARGOT/AP/WIDE WORLD PHOTOS

Given the mere hint of such possibilities, she is struggling to balance the unforgiving demands of science against the expectations of a public understandably eager to live longer. Some scientists have gone so far as to talk of "practical immortality," the idea that human life span can be extended perhaps hundreds of years. Kenyon recoils from the notion, but does not entirely retreat from its contemplation. "These worms aren't immortal. They live twice as long. Or they live four times as long. In fact, we can now get 'em to live six times as long." She pauses, then allows that it's not theoretically *impossible* to make nematodes practically immortal, though, she says, "we haven't."

And therein may lie the difference between molecular biologists and philosophers: the latter often inflect their pronouncements with a palpable, if unspoken, "but." The unspoken phrase for biologists is always "not yet." ○

Blamed for destroying one of North Africa's most important forests, Morocco's Barbary macaques struggle to survive – BY JOHN F. ROSS

PHOTOGRAPHS BY ENRICO FERORELLI

MONKEY IN THE MIDDLE

HIGH IN THE ATLAS MOUNTAINS OF MOROCCO an important ecological drama is playing out, with the future of North Africa's largest intact forest and the welfare of many Moroccans at stake. Like nearly all eco-dramas, this one has an embattled, misunderstood protagonist and enough conflict and blame to fill a Russian novel. It's also a reminder of nature's delicate interconnectedness—a parable of how the destruction of one natural resource may eventually cause large and untoward harm to people, among other interesting life-forms.

Ranging through the mountains—which protect Casablanca, Marrakesh and other cities along Morocco's northern coastal plain from the Sahara—are vital forests of oak and cedar. The forests capture rain and snow blowing in from the Atlantic Ocean, and the precipitation feeds underground water sources, or aquifers, that

Some Moroccan authorities attribute the decline of the Atlas Mountains forest to the stripping of cedars (above) by the Barbary macaque (right). But others say the trees are falling to drought, disease and overgrazing by goats and sheep.

Among the key culprits in forest destruction are the flocks of sheep that Berbers tend for absentee investors. The shepherds have also built walled wells (below), denying macaques access to water and perhaps driving them to strip cedar bark to obtain moisture.

in turn supply water for many Moroccan crops. The problem is that trees have begun dying at an alarming rate, and meanwhile the water table is decreasing, crops have been threatened and the Sahara's reach has expanded.

The leading protagonist in this drama is the Barbary macaque (*Macaca sylvanus*), a medium-sized monkey found only in Morocco, Algeria and Gibraltar and also known as the Barbary ape for its resemblance to its larger, also tailless, cousin. The Barbary macaque is one of 20 species of macaque, which inhabit a greater variety of the world's habitats and climates than any other primate except human beings. In Morocco, which has been beset by drought for at least a decade, officials largely blame macaques for killing the Middle Atlas forest, because the animals are known to strip bark from cedar trees to get at the moist, nutrient-rich living tissue underneath. Though Barbary macaques have been designated as a vulnerable species by the World Conservation Union (IUCN), meaning the animal is at high risk of extinction in the wild in the not-too-distant future, some Moroccan officials dispute that the monkeys are scarce and have even considered relocating the animals to help save the forests. "The predators of the monkeys, like the panther and

the lion, have been killed, and now we have too many monkeys," says Ahmed Kaddaf, engineer-in-charge of the water and forests authority in Ain Leuh, a village adjacent to the Middle Atlas forest.

But an Italian scientist who has studied macaques in Morocco for 20 years says the monkeys have nothing to do with the deforestation. Andrea Camperio Ciani, 46, a primatologist at the University of Padua, says the monkeys have merely become "scapegoats for all that's wrong in the area." In fact, he argues that macaques are the victims of the dying forest, not the other way around; water and food shortages have played a large part in the animals' decline, he says, from

Former SMITHSONIAN *senior editor* JOHN F. ROSS *writes from his home in Bethesda, Maryland. Photographer* ENRICO FERORELLI, *a longtime contributor, provided reporting to this story.*

Italian primatologist Andrea Camperio Ciani (top left, with insect-infested cedar) says macaques (below) are "scapegoats" for other things that are damaging the forest: cutting (top right); overgrazing (above left); and charcoal production (above right).

40,000 to 6,000 nationwide in the two decades he has been studying them. Poaching has also taken a toll, he says; poachers sell the animals as pets to tourists for $65 to $115 each.

Camperio Ciani argues that Morocco's cedar and oak forests are dying for a number of complex reasons, including logging, parasitic infestation and drought-induced tree diseases. Similarly, a fast-growing human population has strained scant water sources, with towns such as Ifrane, Azrou and Ain Leuh pumping water out of aquifers. In the past decade, the region's water table has fallen 40 percent because of persistent drought conditions, according to Brahim Haddane, director of Morocco's national zoo outside Rabat and an IUCN representative. In addition, commercial charcoal makers also harvest oak trees.

But the biggest problem, according to Camperio Ciani, is the herding practices of the area's 750 Berber shepherds and their families. Not only do these semi-nomadic people herd their own goats, which are notoriously hard on vegetation, roots included, they also tend large flocks of sheep on behalf of absentee investors. In recent years, the region's 1.5 million grazing sheep and goats have in places all but stripped the forest lands and environs of low-lying vegetation, says Haddane. Moreover, says Camperio Ciani, shepherds further contribute to deforestation by cutting low branches to provide fodder for their animals as well as heating and cooking fuel. In theory, the Moroccan government, which owns most

of the Atlas Mountains forest, allows some logging but prohibits such branch cutting. Still, Camperio Ciani says that for a bribe of 1,000 dirhams or so (about $115) some forestry officials will look the other way. "These woods should have a thick underbrush for regeneration to take place and hold the soil," he says, adding that without the underbrush, erosion turns the forest into a carpet of stones.

The director of the Conservation of Forestry Resources in Morocco, Mohamed Ankouz, says the forest is in decline because people are on the rise. "When we were 6 million people, the balance was right," he said in an impromptu interview in Rabat in 2002. "Now with 30 million, we have quite a prob-

"These woods should have a thick underbrush to hold the soil," says Camperio Ciani (above, with student Elena Pellizzari in the Atlas Mountains in 2002). Moroccan official Mohamed Ankouz (below) worries there may be too many monkeys for the forest's own good.

lem. And 10 million make a living, directly or indirectly, in or around the forest. We have had years of drought and the forest is very fragile, and the shepherd's use of the land compromises regeneration." Still, he added, the macaques are a problem and the government has considered moving them.

Camperio Ciani acknowledges that macaques strip bark from cedars but says that's a desperate measure in response to drought conditions exacerbated by shepherds. Droughts during the 1990s prompted the shepherds to set up forest camps near springs visited by monkeys. Some shepherds built concrete enclosures around the springs, blocking the monkeys' access to the water. Camperio Ciani says the macaques then turned to eating the tops of cedar trees to get at the cambium tissue underneath the bark to slake their thirst. "Making water more accessible to wild animals," Camperio Ciani and co-workers wrote in the journal *Conservation Biology*, "might reduce bark-stripping behavior." The scientists propose rigging the concrete wells with ladders to accommodate the monkeys. In any event, the monkeys don't kill healthy trees, says Mohamed Mouna, of the Scientific Institute of the University Mohammed V in Rabat. Most of the trees debarked by the macaques, he says, "are alive and well today." Meanwhile, the IUCN, in response to a request from the Moroccan government, has agreed to help study Barbary macaques in the wild and, among other things, assess how the monkeys' bark-stripping affects forest health.

Today's field biologists not only have to study animals, but also delve into seemingly intractable social, economic and land issues. At a conference in Ifrane this past June, Camperio Ciani presented a forest restoration plan that involves raising the Berber's standard of living, making residents more aware of deforestation, supporting eco-tourism and restricting absentee investments in sheep. Without these steps, the Moroccan eco-drama will have only one conclusion, he says: things will get far worse for macaques and humans alike "if the root causes of the environmental deterioration aren't addressed." ○

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Doris Duke's Isla

The Honolulu hideaway built by "the richest girl in the world" is now a museum showcasing her unique collection of Islamic art

BY DOUG STEWART

PHOTOGRAPHS BY DAVID FRANZEN

Duke (at her Honolulu home in 1966) built the Islamic-style estate, called Shangri La, in 1938. Set on a bluff looking out onto Diamond Head, the eclectic compound includes a pool house modeled after a 1647 Iranian royal pavilion.

mic Art Retreat

IN 1938, American tobacco heiress Doris Duke embarked on one of her periodic shopping trips to Europe and Asia. Then 25, "the richest girl in the world"—as newspapers had dubbed her when she was a child—was eagerly acquiring antiques and fragments of old buildings to outfit her lavish new home in Hawaii, which she called Shangri La. "It seems almost incredible," wrote *New York Daily News* society editor Nancy Randolph, "that there can be a square inch of space left . . . for another bit of bric-a-brac, after the months and months Doris has spent scouring Europe and the Far East for furnishings and knickknacks."

Today those "knickknacks" form the nucleus of one of the most spectacular collections of Islamic art in America. Duke, who died in 1993 at age 80, spent nearly 60 years filling her secluded Hawaiian home with more than 3,500 art objects, almost all from the Muslim world: ceramics, textiles, carved wood and stone architectural details, metalwork and paintings. The oldest pieces date from the 7th century, but the majority come from the 17th to 19th centuries.

Having no direct heirs, Duke left the bulk of her billion-dollar estate to charity. Among other bequests, her will established the Doris Duke Foundation for Islamic Art to "promote the study and understanding of Middle Eastern art and culture." The foundation transformed her Hawaiian hideaway into a museum, which opened in November 2002. Tours have been sold out ever since, hardly surprising in light of Americans' newfound hunger to understand the Islamic world. An additional lure is the chance to step inside the dream house of one of the wealthiest, most eccentric and most reclusive public figures of the 20th century.

"For most Islamic art historians, Shangri La was a kind of rumor, a shadowy place everyone had heard about but few people had actually seen," says Thomas Lentz, director of the Harvard University Art Museums, who visited the new museum last year. "Walking into that building for the first time was an amazing experience. It's a kind of marvelous jumble of mediums, periods and quality you wouldn't find anywhere else. To see an imitation of a 17th-century Safavid palace facing a huge swimming pool on a spectacular site on the coast of Hawaii—after a while, the mind starts to whirl." Shangri La's five acres are tucked into an upscale Honolulu neighborhood near the promontory Diamond Head on Oahu. Access is limited to a dozen visitors at a time, who arrive by van four to six times a day from the Honolulu Academy of Arts, about six miles away, where a new Duke Foundation-funded gallery of Islamic art serves as an introduction to the museum.

DUKE, BORN NOVEMBER 22, 1912, WAS the only child of Nanaline Lee Holt Inman Duke, a chilly, distant figure, and James Buchanan Duke, the hot-tempered, high-living founder of the American Tobacco Company (original maker of Lucky Strike cigarettes) and the Duke Power Company, as well as the benefactor and namesake of Duke University. The press welcomed Doris as "the Million Dollar Baby" and claimed that she ate from a 14-carat-gold dish. Her father lavished the little girl with gifts (a pony, a harp, furs) and named his private railway car *Doris*.

The press dubbed Doris (at age 6 with her tobacco tycoon father, James Buchanan Duke, c. 1919) "the Million Dollar Baby."

At his death in 1925, "Buck" Duke left 12-year-old Doris a $50 million fortune. (His widow had to make do with a $100,000 annual allowance.) Doris asserted her independence early on. At 14, she took her mother to court to stop the sale of Duke Farms, the family's baronial estate in New Jersey—and won. When she received the first chunk of her inheritance on her 21st birthday (along with an accordion, which she'd requested from her mother), photographers laid siege to the family's 54-room Fifth Avenue mansion.

Duke (above, with first husband James Cromwell in Honolulu, c. 1935; center, with second husband Porfirio Rubirosa in 1947; and right, with friend Sam Kahanamoku at Shangri La, c. 1939) hated giving interviews and booked hotel rooms under pseudonyms.

BETTMANN / CORBIS (2); DORIS DUKE CHARITABLE FOUNDATION, ARCHIVES, DUKE FARMS, HILLSBOROUGH, N.J.

Newsweek was already calling her a "legendary figure."

As a young woman, Duke was unpretentious, headstrong, adventurous and reserved, even reclusive. The ferocious press attention she endured from childhood fed a lifelong mania for privacy. She refused virtually all interviews and booked hotel rooms under assumed names. Slender and leggy with exotically large eyes and a prominent chin, she was self-conscious about her height (6 foot 1)—in photographs with shorter companions, she often slouched or leaned. She inevitably made good copy. She converted a B-25 bomber into her own private luxury airliner and for years kept a pair of Mongolian camels at one of her estates. When local officials forbade camel ranching, she gave the animals the run of the mansion's ground floor, carpets be damned.

"She had a very soft voice," says Emma Veary, 73, a longtime friend who was often a guest at Duke's homes. (Besides Shangri La and Duke Farms, there were estates in Rhode Island, New York and California.) "We called her 'Lahi Lahi,' which means fragile in Hawaiian, because of her voice." But she wasn't mousy, Veary says. "In her quiet way, Doris was very strong. She knew what she wanted, and she had the wherewithal to get it."

In 1935, at 22, Duke married James H.R. Cromwell, a 38-year-old sportsman and gambler who was going through his own inheritance at a furious clip. The couple set sail on a ten-month, much-publicized round-the-world honeymoon, with stops in Europe, Egypt, India, Indonesia and China and meetings with both Stalin and Gandhi.

For Duke, the honeymoon was a life-changing experience—no thanks to Cromwell, to whom she quickly cooled (starting when his check for the first leg of the honeymoon bounced). She developed a passion for Islamic art, especially the graceful royal architecture of Mogul India. She was especially moved by the Taj Mahal, the Muslim mausoleum completed in 1647 in Agra, India, by the emperor Shah Jahan. Inspired by motifs she saw there, Duke immediately ordered a sumptuous marble bedroom-bathroom suite, inlaid with

Massachusetts-based author DOUG STEWART *wrote on pulp art and Boston Harbor Islands in* SMITHSONIAN'S *August 2003 issue.*

jade, malachite and lapis lazuli. The couple intended it for a wing they planned to add to El Mirasol, the Palm Beach estate of the groom's mother, Eva Stotesbury. (Critics referred to the proposed addition as the Garaj Mahal.)

Duke also fell hard for the last stop on the honeymooners' itinerary: Hawaii. Delighted by the island chain's climate, informality and remoteness, the couple extended their stay to four months. By the time they left, the young bride had dropped the idea of moving in with her mother-in-law and had resolved to create an Islamic-flavored home of her own on Oahu. In a rare public comment, she explained her thinking in a 1947 article for *Town & Country*: "The idea of building a Near Eastern house in Honolulu must seem fantastic to many," she wrote. "But precisely at the time I fell in love with Hawaii and decided I could never live anywhere else, a Mogul-inspired bedroom and bathroom, planned for another house, was being completed for me in India, so there was nothing to do but have it shipped to Hawaii and build a house around it."

Socialites were expected to furnish their mansions with art, of course, though not usually with Islamic art. "Doris Duke was perfectly comfortable living with old masters and American decorative arts and furnishings, which she grew up with and had in her other homes," says Shangri La's executive director, Deborah Pope. "But when she built her own house here in Hawaii—and this was all her—it was a declaration of her own aesthetic. She had no need to do things because other people were doing them."

The house was basically completed in 1938, the first private home in Hawaii to cost more than a million dollars ($1.4 million to be precise). Duke, a lifelong movie buff, took its name from the 1937 film of the book *Lost Horizon,* about a remote and secret paradise called Shangri-La, where no one ever grew old. After separating from Cromwell in 1940, Duke wintered nearly every year at her tropical estate. (Her only child, a premature daughter, died 24 hours after birth in 1940. A second marriage, to Dominican playboy Porfirio Rubirosa in 1947, lasted just a year.)

Shangri La's New York- and Palm Beach-based architect, Marion Sims Wyeth, had first proposed a huge and imposing mansion, but his young client overruled him. The completed 14,000-square-foot house is hardly small, but it is low and rambling rather than grand. It reveals its secrets step by step. Facing a banyan-shaded front courtyard at the end of a twisting, gated driveway, the house's exterior is unremarkable: a plain one-story plaster wall bisected by a dark wooden door. Behind the door, elegantly appointed living spaces and walkways radiate asymmetrically from an inner courtyard, much as they do in homes of the wealthy in the Middle East.

But "you wouldn't find this home in the Islamic world," says Sharon Littlefield, Shangri La's curator, "partly because it is such a mishmash of different cultures and regions. It's definitely one collector's personal vision." In *Town & Country*, Duke called the décor "Spanish-Moorish-Persian-Indian." She chose the placement of every tile, dish and lamp.

The interior is especially rich in ceramics. Duke was fond of *mina'i* ware (from the Persian word for "enamel"), delicate glazed pottery from 12th- and 13th-century Iran that is commonly painted in gold, turquoise and cobalt blue before being fired a second time. Some moon-faced horsemen adorning the ceramics have a decidedly Chinese cast, a legacy of Buddhist art that early travelers imported into Iran. "We may think of the Islamic world as isolated from other cultures," says Littlefield, "but there was a huge amount of trade going back and forth with China and later Europe."

The prize of the collection is a large, exquisitely crafted *mihrab*, or prayer

BOTTOM: MAYNARD PARKER

"You wouldn't find this home in the Islamic world," says Sharon Littlefield, Shangri La's curator. "It's one collector's personal vision." Duke called it "Spanish-Moorish-Persian-Indian."

"She was Doris Duke. She didn't have to play the socialite trying to make a big impression," says collections manager Owen Moore. In a rare public expression, Duke wrote about her Hawaii home for a 1947 issue of *Town & Country* magazine (opposite).

niche. The fixture, which came from a well-known tomb in Veramin, Iran, and dates to 1265, once oriented the devout toward Mecca. Its surface is composed of luster tiles, a luxurious, hard-to-work medium that, according to Persian chronicler Abu'l Qasim in 1301, "reflects like red gold and shines like the light of the sun." Duke's mihrab is significant not only for its monumental size and superb craftsmanship but also because it's signed and dated by a member of the Abu Tahir family, an illustrious line of Kashan potters who passed down their glazing secrets from father to son and dominated the industry for four generations.

"This is one of the most important works of Iranian art and possibly of Islamic art in North America," says Marianna Shreve Simpson, a former curator of Islamic Near Eastern art at the Smithsonian's Freer Gallery of Art and Arthur M. Sackler Gallery and a consultant to Shangri La from 1997 to 2003. "Few such virtually intact interior features survive today—certainly nothing of this grandeur." Duke bought the mihrab from a dealer in 1940 and installed it off of Shangri La's living room, pointing not to Mecca but to Mexico.

Though Duke was not religious, she meditated daily and told friends she believed in reincarnation. "She was interested in everything," says Violet Mimaki, 69, her Shangri La secretary and estate manager for 22 years. "I can't say that she was a Catholic or a Buddhist, but she had a Bible in her bedroom. And copies of the Koran—lots of them."

The oldest Koranic text in the collection is a sheet of parchment from around A.D. 900. The bold, angular lettering in ink and watercolor is an early writing style called Kufic script. Considered the literal word of God, the Koran has always been viewed as Islamic art's most exalted subject, and Shangri La is everywhere embellished with Koranic calligraphy and geometric abstractions. A wall of the inner courtyard, for example, is embedded with a rare collection of monochromatic tiles believed to have once graced the Takht-i Sulayman, a 13th-century Mongol palace in Iran. As in much of the Muslim world, the home's decorations—from tiles and wall hangings to carved doors and ornamental ceilings—enliven spaces the way prints or paintings animate a Western home. In fact, there's a notable absence of pictures or other

On their honeymoon in 1935, husband Cromwell wrote, Duke fell in love "with the Taj Mahal and all the beautiful marble tiles with their lovely floral designs." She immediately commissioned a bathroom (above, at Shangri La) inspired by the inlaid motifs.

personal effects on display at Shangri La. "This is how it was in Doris Duke's lifetime," says Littlefield. "I think there were a few photos in her bedroom, mostly of her dogs."

Though Duke mixed centuries and continents at will, her focus on light, color, texture and geometric repetition helps to unify the result. "She was interested in surfaces," says Kazi Ashraf, an assistant professor of architecture at the University of Hawaii, who acted as a consultant to the new museum. "That's why she was drawn to marble, which changes with the light." It was the look and feel of the Taj Mahal's stonework, he points out, not its overall form, that first inspired her to build an Islamic-style home.

Duke used traditional elements in untraditional ways. "In my Indian bedroom," she wrote in 1947, "the carved, cut-out marble *jalis*, or screens, which were formerly used by Indian princes to keep their wives from other eyes, have a new purpose: they are not only decorations, but a means of security, for they can be locked without shutting off the air. . . . "

In a more modern vein, an entire wall of Shangri La's living room is a sheet of glass that can be made to disappear into the basement. "It's one of the marvels of the 1930s," says Jin DeSilva, caretaker of the house during the last 14 years of Duke's life. When the wall vanishes, the room opens directly onto Diamond Head. "When Miss Duke was alive," says DeSilva, "she rarely lowered the glass wall completely. At one time she had 12 German shepherds, and if this was down they'd come running inside wagging their tails. We had two or three accidents that way." An enormous ceramic vase was one such casualty, as its cracks attest. "Miss Duke would sit down and glue everything together herself," DeSilva says.

Several of the artifacts in the room once belonged to publishing magnate William Randolph Hearst. Facing bankruptcy in the late 1930s, Hearst was forced to sell many of his antiquities at bargain prices. Duke took advantage of the tycoon's distress by picking up, among other objects, a medieval stone fireplace from Islamic Spain, which is now installed in the living room.

Duke loved bargains. Gossip columnist Elsa Maxwell once wrote of Duke and her first husband that "he could, and did, spend a fortune; she thinks twice before agreeing to buy

In the early 1960s, Duke turned the dining room (above, today) into a tentlike environment, with Egyptian and Indian textiles, evocative of nomadic Islamic life. The living room's carved wooden doors and ceiling (below) were made in Morocco c. 1938.

a ticket to a charity ball." Following a rare photographic session for *Life* magazine in 1939, Duke asked photographer Martin Munkacsi where she might buy a camera wholesale. A receipt for three antique bureaus she purchased in Damascus, Syria, in 1939 bears the dealer's notation: "Only: Forty-Three Dollars & 60/100." The merchant obviously understood his customer.

Duke was no purist. To dress up a courtyard wall, she custom-ordered reproduction tile mosaics from a workshop in Esfahán, Iran. And she had a studio in Morocco fabricate the ornately carved and painted wooden ceilings of her foyer and living room. Her taste was defiantly personal. To guard her front door, she selected a pair of stone camels from a Honolulu department store.

But if Shangri La's décor was eclectic, it was hardly thrown together. In 1938, Duke visited Iran with art adviser Mary Crane, a New York University graduate student. There they obsessively sketched and photographed a 17th-century royal pavilion in Esfahán known as the Chihil Sutun. Duke had a scaled-down version built at Shangri La, which she called the Playhouse and used as a combination guest and pool house.

Unlike most of the art in Shangri La, the works inside the Playhouse teem with human figures. While Sunni Muslims have long mistrusted representational art—even pictures of animals and buildings—as invitations to idolatry, Shiite Muslims tend to be more easygoing about representation, especially regarding their secular art. A large tiled fireplace surround in the Playhouse, depicting court life during Iran's Qajar dynasty early in the 19th century, is decorated with colorful acrobats and musicians. Nearby, a Qajar oil painting shows a young, bejeweled woman (p. 79) strumming a long-necked stringed in-

One of the most important works of Iranian art in North America, the living room's 13th-century *mihrab*, or prayer niche (left), is faced with luster tiles. The "Turkish Room" (right) was created from pieces of the interior of a 19th-century Damascus mansion.

strument. "One reason Iran produced so much figural art is that it had a rich tradition of secular literature," says Littlefield. (Persians devoured love poetry in particular.) Until recently, scholars dismissed Qajar art, with its European influences, as decadent; Duke found it "amusing" and thus perfect for the Playhouse.

"Doris was a prankster," says friend Emma Veary, whose Hawaiian mother Duke often enlisted as a traveling companion. "Mother was very dark-skinned, and once, for a party, Doris dressed her in saris, put her on pillows, and stuck diamonds on her nose, then introduced her to everyone as the maharani of somewhere. People bowed and kowtowed to her all night. Doris had told her, 'Don't say anything,' so Mother just glared at the people."

In her first years in Hawaii, Duke sometimes entertained socially but, says museum director Deborah Pope, "usually with just a small circle of friends, mostly native Hawaiians. A lot of them were swimmers, surfers, dancers and musicians—people with day jobs. They weren't socialites. That's what she came to Hawaii to get away from." Shangri La was not air-conditioned, and Duke padded around it in bare feet or flip-flops. She learned to play Hawaiian music, hula and surf (the collection includes some old surfboards), and she once won an outrigger canoe race off Waikiki Beach with her friend Sam Kahanamoku, brother of legendary surfer and Olympic gold medal swimming champion Duke Kahanamoku.

In an interview with Andy Warhol in 1979, writer Truman Capote recalled being surrounded by a pack of Duke's snarling dogs while taking a stroll around Shangri La one evening. "No one had warned me," Capote said, "that each night after Miss Duke and her guests had retired this crowd of homicidal canines was let loose to deter, and possibly punish, unwelcome intruders." After standing rigid for what seemed to him like hours, Capote was finally rescued when a gardener whistled to the dogs and they trotted off, tails a-wagging.

Now that the dogs are gone, visitors to Shangri La can experience Duke's garden as a paradise of shade trees, running water and quietude—a recurring image in the Koran. A particular gem is the Mogul garden, a smaller version of the Shalimar Gardens in Lahore, Pakistan, that reveals itself like a

Used as a pool house/guesthouse, Shangri La's "Playhouse" was patterned after a 17th-century royal pavilion in Esfahán, Iran. Its interior (above) features artworks—such as the painting below—created during the 19th-century reign of Iran's Qajar dynasty.

mirage behind a door near the entrance. Its centerpiece is a narrow pool of water punctuated by lotus-shaped fountains.

The formality of the Mogul garden reflects Duke's later taste. Her last major acquisition was an elaborate interior from a deteriorating 19th-century mansion in Damascus, which she bought from the estate of New York dealer and philanthropist Hagop Kevorkian in the early 1980s. The home was one of at least four villas owned by the Quwwatlis, a wealthy merchant family in the old city. "When the crates [containing the dismantled room] arrived, the boards were all black and dirty," says ex-secretary Violet Mimaki. Duke, then in her 70s, oversaw a months-long clean-up campaign. "She had us spread everything out in the courtyard, and she tested out different cleaning solvents with Q-Tips," Mimaki recalls.

Duke supplemented the room's original interior with glassware and metalwork she already owned and cabinetry she commissioned from woodworkers in Rhode Island. She called it the Turkish Room. Below a few small, high windows, everything seems to be carved, cushioned, mirrored, inlaid or gilded. The overall effect is a bit overwhelming. "It's clearly not a space you live in," says Deborah Pope. "Although Duke used it for entertaining, it's more of a display space. At this point, she was thinking about how she wanted the house to be when she was no longer here."

Despite its Hollywood name and its owner's many eccentricities, Shangri La is the creation of a serious collector, not a dilettante's indulgence. "There was a degree of escapism maybe in that Doris Duke was trying to distance herself from her upbringing," says Sharon Littlefield, "but this was no passing fancy. Her interest in Islamic art was very personal to her, and it sustained her to the end of her life." ○

Doomed POWs: In April 1942, some 70,000 troops (photograph taken by a Japanese guard) set off on a brutal 65-mile foot journey. Today, in Bataan province (where children frolic along the march route, at right), memory of the harrowing march is rapidly receding.

IN THEIR FOOTSTEPS

Retracing the route of captured American and Filipino soldiers on the Bataan Peninsula in World War II, the author grapples with their sacrifice

BY DONOVAN WEBSTER

PHOTOGRAPHS BY CHIEN-CHI CHANG

ON A SUN-SCOURED, early summer morning in Mariveles, a seaport town at the tip of the Philippines' Bataan Peninsula where jungled mountains kneel to the sea, the temperature quickly rises above 100 degrees. The tide is low; the few fishing boats not already out for the day have been left tilting on the beach of the inner harbor, their outriggers turned against the pale blue sky like the ribs of a skeleton lying on its back. Beneath the grounded boats, crabs scuttle for food across the mud under every wooden hull.

This is where it began, the ordeal we have come to know as the Bataan Death March. In this place I am about to begin retracing a tragic, heroic chapter of World War II.

Sweat pours off my face and onto my notebook as I copy words off a bronze plaque at the start of the Bataan Death March. Thousands of "Filipino and American troops were marched day and night, under blistering sun or cold night sky." In December 1941, just hours after the attack on Pearl Harbor, the Japanese launched a lightning-fast aerial assault on the Philippines. American and Filipino troops mounted a courageous defense of this densely forested peninsula. But after four months, the unprepared and undersupplied Allied troops were left so wholly destitute that they had no choice but to surrender. According to 92-year-old Manuel Armijo, an American who was with the 200th Coast Artillery in Bataan in 1942, "We had lots of weapons, but we didn't have any ammunition."

BENEATH THE WITHERING SUN, I set out on the 65-mile route those soldiers followed more than 60 years ago. From Mariveles, on April 10 of that year, some 70,000 Allied prisoners of war—about 14,000 Americans; the rest Filipino—commenced a deadly forced march into the jungle. Their destination was a former Filipino Army training base, Camp O'Donnell. Nearly one in six of the marchers would not arrive. (Of those who did, most would be shipped out over the next few months to other Japanese prison camps.)

The story of Bataan is one of those episodes in American history many are reluctant to acknowledge, implying as it does a betrayal of American troops by a succession of commanders who abandoned them to their fate. Americans had occupied the Philippines for more than 40 years—since 1898, plenty of time to prepare adequate defenses on these strategic islands. The Japanese threat had been clear for years. Yet the roughly 25,000 Americans under the Philippine command of Gen. Douglas MacArthur had only begun to train more than 100,000 green Filipino troops for combat when a force of 50,000 Japanese came ashore on December 22, 1941, quickly overrunning Manila. MacArthur had ordered the evacuation of the city, advising his headquarters and staff to retreat to Corregidor Island in Manila Bay, 30 miles away. The bulk of his troops and the untrained Filipino forces withdrew along Manila Bay into the mountainous Bataan Peninsula north and west of the city. From January to April 1942, Allied troops on the island fortress of Corregidor and in Bataan were pounded relentlessly by artillery and small-weapons fire. With access to weapons and supplies cut off and a location less defensible than Corregidor, the Bataan troops were the first to collapse. On April 9, 1942, Maj. Gen. Edward P. King Jr. turned over more than 70,000 men under his command to Japan as prisoners of war. "In the end," says Steve Waddell, a military historian at the U.S. Military Academy at West Point, "what happened at Bataan came down to an underestimation of the enemy. We were training the Filipinos for what appeared to be a coming war, and we were cut off from our stores of weapons and provisions, which filled warehouses in Manila. Under those conditions, collapse becomes [only] a matter of time."

Today, on the National Road from Mariveles to the city of San Fernando, most of it highway, crowded towns and housing subdivisions have largely replaced the banana trees and jungles of World War II. In daylight, the road is choked with trucks, cars and smoke-belching, sidecar motorcycle taxis. Small hotels, family-run groceries and wayside cold-drink stands crowd the highway's shoulders.

Passing by the huge Dunlop Slazenger sports manufacturing facility at the edge of Mariveles, I walk beneath spreading acacia trees, nodding to fishermen who mend green nylon nets on the shady sidewalk. I am really sweating now; it cas-

The Death March route (below) commenced in the seaside town of Mariveles (a monument, above, marks the starting point). From here, reads a plaque, "Filipino and American troops were marched . . . under blistering sun or cold night sky."

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CHIEN-CHI CHANG, MAGNUM PHOTOS. MAP: MIKE REGAN

cades down my arms and drips from my fingertips. But at least I am not sick and weak from four months of jungle fighting and skimpy rations, as were most of the surrendered Allied troops. Ahead, the narrow Zig-Zag Road, a series of switchbacks, begins its long, steep climb up the escarpment. After an hour's walk dodging a steady stream of vehicles, I reach the top of the rise where, mercifully, a cool breeze blows in from Manila Bay. From here, I can see the green peaks of Corregidor ten miles out at sea.

After the fall of Manila, MacArthur retreated to this rocky island fortress. Then, two and a half months later, on March 11, 1942, he abandoned Corregidor and some 11,000 American and Filipino troops on the island to take command of the Allied Australian Theater at Brisbane, famously vowing: "I shall return." On May 6, Gen. Jonathan Wainright would be forced to surrender Corregidor to the Japanese. Most of Wainwright's men would be sent north of Manila to the Japanese-run prisons at Cabanatuan. According to historian Hampton Sides, author of *Ghost Soldiers*, a best-selling history of the Philippines in World War II, "After the war, many soldiers from Bataan came to resent the men from Corregidor who, they would learn, generally had better food, better living conditions and a far lower incidence of malaria than troops on Bataan. Everyone suffered mightily in the battle for the Philippines, but the Bataan guys got the worst." As for MacArthur, he did return—but not until the October 1944 invasion of Leyte.

I AM BREATHING HARD. Just ahead on the roadside's right shoulder, a whitewashed cone rising to about three feet carries a mounted plaque embossed with two angular black figures, one trudging forward, the other fallen. The plaque reads: "Death March 7KM." Seven kilometers. Just over three miles. A mere 62 to go.

The sun beats down relentlessly. Twelve miles along, after passing through the town of Cabcaben, I top another rise. At a bamboo-latticed roadside stand, a shirtless Filipino man named Aurelio is selling freshly harvested coconuts from behind a makeshift plywood counter.

"You are following the Death March?" he asks.

"Yes," I reply. "One coconut, with the top cut off."

"OK." Aurelio grabs a machete. With a flick of the wrist, he slashes into a coconut's inner cavity, the clear milk running

As the author traveled on foot into the largely rural Bataan Peninsula (where roadside fruit vendors, above, and water buffalo, below, are common sights), he found residents were reluctant to talk with him. Explained a Filipino guide: "They think you're CIA."

After they were besieged for four months, Allied troops (their hands bound soon after capture) surrendered April 9, 1942. Recalls survivor Edward Thomas: "The Japanese were just the Enemy. I had no idea what would happen when I met them face to face."

down the outer shell. He hands it to me. The juice is sweet, tart and cool. "Just remember," he says, "at Limay this road splits to the right from the newer superhighway. Don't go left, or you'll miss the old route." I hand over six pesos, the equivalent of about ten cents—the best dime I've ever spent.

Heeding Aurelio's advice, I follow the road to the right nearing Limay; it drops down the hilltop into a valley of rice paddies. A mile in the distance sits the town's cathedral and its harbor, where fishermen hew *vintas*, outrigger canoes, in a small boatyard. Following the road past recently harvested rice paddies in which water buffalo and oxen wallow, I spot a white-painted steel sign bearing the words "Death March Route." As recently as the 1980s, I'm told, there was a marker for every kilometer. Not anymore.

About ten miles northwest of Limay, I come upon a green mountain that juts from the jungle. It is topped by a towering, 30-story-high concrete cross. This is Mount Samat. Here, in April 1942, a fearsome Japanese artillery barrage, followed by an infantry attack backed up by armored tanks, finally crushed the weak, hungry American and Filipino soldiers. "The fall of Mount Samat was the final blow to the Fil-American fighting forces," says Sides. "After their battle lines collapsed, everyone knew that defeat was inevitable."

ON A MARBLE MONUMENT, set on a grassy lawn below the cross, words etched into a wall pay tribute to the Allied soldiers who "spilled their blood on every rock" and hastily buried thousands of their dead in unmarked graves.

The monument, a small museum and the gigantic cross on Mount Samat's summit were all built by the Philippine government after the war. One can take an elevator from the cross's base 242 feet up to an observatory platform, mounted at the point where the bars of the cross intersect. The vista extends in every direction—to Manila Bay and the steeply eroded, 4,000-plus-foot volcanic cones of Mount Mariveles and Mount Natib—out to the vast sweep of the South China Sea.

After the surrender at Mount Samat, the prisoners were trucked back to Mariveles for a procedure the Japanese called "registration," and were divided into groups of 100 to 200 men to be dispatched over the coming days. By the time the prisoners reached Mount Samat again, on foot, several days later, death was everywhere. Some Allied soldiers, felled by exhaustion or malaria, were bayoneted where they lay. The late Richard Gordon fought with the 31st Infantry at Bataan's battlefront. He recalled seeing an American soldier, prostrate with disease and exhaustion, at the edge of the road as a column of Japanese tanks approached. Suddenly, the lead tank swerved from its path and crushed the soldier. "You stand there watching a human being get flattened," Gordon once told me, "and, well, that sticks in your mind forever."

I spend the night in Bataan Province's capital city, Balanga, where the exhaust of thousands of taxis turns the air a smoky

blue. It was not until Balanga that the POWs, having walked all day and into the night from Mariveles, were finally given water and allowed to rest.

BY 7 THE NEXT MORNING, a day that dawns cooler, I loop back down to the town of Pilar, where there had been no accommodations the night before, and then head toward the settlements of Abucay and Orani. The road between these settlements is narrow and clogged with traffic, so I cover my mouth with a bandanna in a vain attempt to filter out the exhaust.

In Pilar, a man slows his motorcycle and pulls alongside of me. "Here, have a mango," he says in a mix of Spanish and English, handing me the fruit and roaring off. It's mango season in the Philippines, a sort of unofficial holiday period where, for a month, it seems that everyone is eating mangoes. Other than Aurelio, the coconut seller 15 or so miles back, the mango man is the only Filipino along the route who acknowledges my existence. Only later will my Filipino friend Arlen Villanueva offer an explanation.

"They think you're CIA," he says. "During Ferdinand Marcos' regime, when the U.S. Naval Base at Subic Bay was still in commission, Bataan was thick with the NPA, the New People's Army, a Communist rebel organization. The NPA posed a threat to Subic and the Americans there. Consequently, CIA agents were all over the peninsula, trying to gather counterinsurgency information. The people living here today would not act against you, but old memories die hard. They will keep their distance."

After covering perhaps 15 miles, I cross into tidal marshlands on a highway elevated above the swamp. Soon I come upon another Death March marker: 75 kilometers, about 45 miles. Just beyond it, boys sell crabs in stacks of three, wrapped tight with string, from bamboo-and-plywood stands. On the outskirts of Bacolor, a community three miles southwest of San Fernando, the landscape turns eerie: much of it is covered in a layer of thin, white ash. Bacolor, I learn, was directly in the path of the 1991 Mount Pinatubo eruption. The lava flows and volcanic-ash fallout hastened the closing, in 1992, of American military bases at Subic Bay and nearby Clark Field. As I pass the town's reconstructed houses, now built on up to 15 feet of once-smoldering rock and ash, the roofs of still-buried shops, houses and churches jut

Although the undersupplied Allied troops (memorialized in a sculpture near the march route, above, and in a cross at the summit of Mount Samat, below) resisted Japanese artillery, defeat was inevitable. Says Edward Thomas: "We knew we were fighting a lost cause."

By the time the prisoners (carrying sick and wounded in improvised litters) advanced the final six miles to Camp O'Donnell (a former Philippine Army post), 11,000 of 70,000 had died. One prisoner wrote: "Hell is only a state of mind; O'Donnell was a place."

from the grayish soil like buildings in a flood. More than a decade after the disaster, huge earthmovers and front-end loaders are still scooping ash.

It was near here, in San Fernando, that surviving POWs began what they called the Bataan Death ride, packed so tightly into narrow, 1918-vintage boxcars that there was no room to sit or even to fall down during the four-hour, 24-mile trip to the town of Capas. Dozens died of suffocation in the airless, rolling ovens. From Capas, the soldiers were forced to make a six-mile hike to Camp O'Donnell, established just a few years earlier as a training post for the Filipinos.

By the time the men reached Camp O'Donnell, at least 11,000 of the 70,000 had died along the way. Conditions in the camp were primitive. There was little shelter, sanitation or fresh water. (Only one spigot worked.) During the first three months at the camp some 1,500 Americans and 20,000 Filipinos would die of dysentery, malaria and malnutrition. "Camp O'Donnell was an absolutely horrific place," says Sides. "American soldiers had not experienced conditions so wretched since Andersonville prison camp during the Civil War. Of O'Donnell, one prisoner wrote that 'Hell is only a state of mind; O'Donnell was a place.'"

No trains go to Capas these days; the tracks have disappeared, torn up or paved over as urban sprawl spread from Manila, 60 miles away. My friend Arlen Villanueva, who works as a driver, was born near Camp O'Donnell and knows its history; he will take me there in his van, following the renamed MacArthur Highway north along the route of the former rail line. "There's not much left of the old war here," he says. "History has been covered by Pinatubo's ash or obliterated by development. It's strange how the past and its artifacts can vanish."

At Capas, we turn onto a smaller road that winds pleasantly through small barrios of low stucco houses bordered by flame trees and red-flowering bougainvillea. Ahead, on the left, just past Marker 112, we come to a triangular marble monument built recently by the Philippine government in honor of veterans living and dead. The Capas National Shrine, as it is called, rises into the twilight sky. Then, just ahead, a yellow road sign reads, "Caution: Tank Crossing." We have arrived at Camp O'Donnell.

With its chain-link fence and a single structure—a white-painted headquarters building—the camp looks like an army training outpost at the end of a long road in the middle of nowhere—pretty much just what it is. Beyond it, terraced hills lead to volcanic mountains. When Arlen and I explain why we've come here to an MP standing at a gate, he nods.

"There's nothing left of the Death March concentration camp," says the MP, Sgt. A. L. Dacibar. "But let me telephone headquarters to see if you can look around." He steps into his guard shack for a moment. "OK," he says, "you're free to explore a bit."

Inside, I stare across grassy hills shaved of trees. Sixty years ago Americans and Filipinos labored here virtually as slaves—burying their own dead—with little food and water. They had no medical care and were entirely cut off from the outside world. Survivor Manuel Armijo recalls that when he had first arrived in the Philippines in 1941, he tipped the scales at 150 pounds. After several months at Camp O'Donnell, he says, "I weighed 80 pounds. We never got anything other than rice to eat, and didn't get much of that. I also had long-term cases of dysentery, malaria and dengue fever."

Sergeant Dacibar turns out to be correct: there is nothing left of the tragedy that unfolded in this place.

ON THE DRIVE BACK to San Fernando, Arlen suggests one last stop, back in Capas, close to the place where the POW train offloaded and the prisoners began their final push on foot. There is one more Death March memorial Arlen wants me to see. About two acres square, the site—just off the MacArthur Highway—consists of a circular driveway, raised grassy areas, and a 50-foot-tall, inverted V-shaped marble sculpture. At its base, a carving depicts emaciated men staggering, fallen.

Inside broken gates, flowering plants encircling the monument have died, and leggy weeds choke the lawn. The sculpture's marble sheathing lies in shards, exposing a skeletal frame of concrete and rusting rebar. Water buffalo hoofprints in the dried mud suggest that livestock, not people, now congregate in this deserted precinct. The back of the monument is defaced by sexually explicit graffiti. Where the bas-relief depicts a Japanese soldier bayoneting an Allied soldier, birds have built shaggy straw nests in the concavities. The Death March has been consigned to the netherworld of our rapidly receding collective memory.

By making this journey into the past, and experiencing the heat and sweat along the way, I've tricked myself into believing that somehow I could better understand the suffering of those who came before me. In the end, though, the ordeal of the men who walked this route lies beyond words or even comprehension.

As I pick my way through briers toward the car, thick sheets of rain begin to cascade down.

"This is the first night of the monsoon," Arlen says. "The rainy season is late. People will be putting buckets on their roofs tonight. It's a cause for celebration."

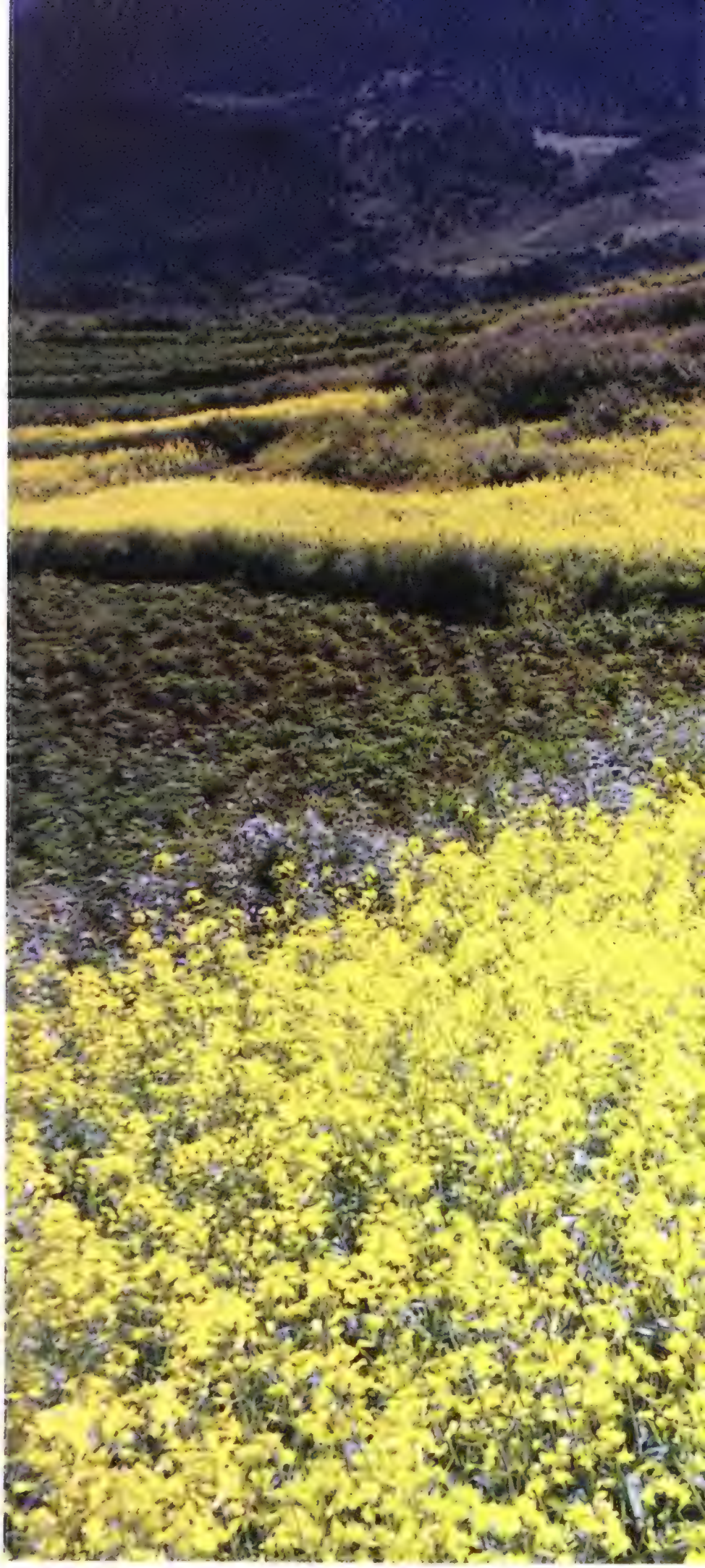
Walking from the ruined memorial through the year's first downpour, the prospect of a celebration seems beyond imagining. "Let's get out of here," I say. ○

Along the Death March route, only a handful of memorials (including monuments at Camp O'Donnell, below, and in Capas, above), remain. Says historian Hampton Sides: "Everyone suffered in the battle for the Philippines, but the Bataan guys got the worst."

With donated cameras, residents of remote villages document endangered ways of life, one snapshot at a time

Visions of China

SINCE 2001, the Arlington, Virginia-based Nature Conservancy has equipped more than 220 people in 61 remote villages in China with inexpensive, point-and-shoot cameras and encouraged them to capture their lives on film: their chores and rituals, dwellings and animals, sorrows and delights—and especially their natural surroundings. Then the villagers talked about the resulting pictures to local oral historians. So far, this venture, called Photovoice, has amassed about 50,000 photographs, some of which have already been exhibited in Shanghai and Beijing. Additional exhibitions are being planned



"The Torch Festival is the most important event to the Yi people. In the daytime, the Yi hold a ceremony to offer prayers to the gods or spirits associated with our lives. In the picture my sister-in-law—my second brother's wife—was offering prayers to the God of Earth with chicken blood. After twilight, people lit torches to send the gods back. The celebration is all bustle and excitement. We slaughter goats and chickens, drink liquor, sing songs and dance. We also invite our best friends to a big feast."

—HONG ZHENGYONG, 28

Xuehua village

for venues in the United States and China in 2004 and 2005.

The work is part of a collaboration between the Chinese government and the Nature Conservancy called the Yunnan Great Rivers Project, which was designed to create and protect a series of parks and wildlife preserves throughout more than 25,000 square miles (about the size of West Virginia). The project is China's most ambitious attempt at preserving the ecosystems within the vast area of the Yunnan Province and will serve as a model for the rest of the country. These mountainous lands bordering Burma (Myanmar) and Tibet hold, among other biological riches,

For the Photovoice venture, scores of villagers (above, Yang Yuxiu, a 30-year-old denizen of Manxiang village, reviews her work) were recruited to photograph—and explain—particulars of daily life.

"I followed my neighbors to the lake of Lashi and took several pictures of villagers hauling the fishing basket, weighing the fish and holding the big fish with great joy. On that day, they caught one fish that weighed more than four kilograms and two that were more than six kilograms each. My neighbor earned 180 yuan from one day of fishing."

—HE YUNYING, 30
Gele village

"My father is 80 years old this year. He is the only *bimo* [a shaman in the traditional animist religion of his ethnic minority] in Wenhai and also the best in Lijiang. He is a well-known intellectual among the Yi people. Each year he is invited to preside over various bimo ceremonies by the Yi people from Lijiang, Ninglang and Jianchuan, and I accompany him. Among the seven sons in my family, two were forced to work due to the Cultural Revolution; four lost their interest in Yi traditional culture. And I became the only volunteer to inherit my father's knowledge and job."

—HONG ZHENGYONG, 28

Xuehua village

"The elder sister of my husband herds goats seven hours every day in the mountains. Among the 63 goats she has, 38 belong to my family."

—SHA GUIXIANG, 38

Nanyao upper village

Visions of China

"A Photovoice facilitator records the stories about the pictures that the villager-photographer took."

—YANG YUXIU, 30
Manxiang village

"One day I was climbing the mountain with my camera, and happened to see the Jinsha [Yangtze] River valley in Longpan County, which was spectacular."

— SHA YUFANG, 33
Nanyao upper village

virgin forests, some 7,000 endemic plant species and 30 endangered animal species, including snow and clouded leopards, Yunnan golden monkeys and red pandas. The region is also home to three million people belonging to 15 ethnic minorities.

As China modernizes, many traditional beliefs become endangered. "I have come to understand how much these villagers have to teach us," says Ann McBride-Norton, the Conservancy's director of Photovoice, "and how deeply their love of the natural world is ingrained in their culture and religion. —*MARLANE LIDDELL*

"These are my husband's friends. They went hunting one day and came back empty-handed."

—JIN SHENGHUA, 24

Xuehua village

"How similar these two little boys look!"

—LI CHUNYAO, 31

Nanyao lower village

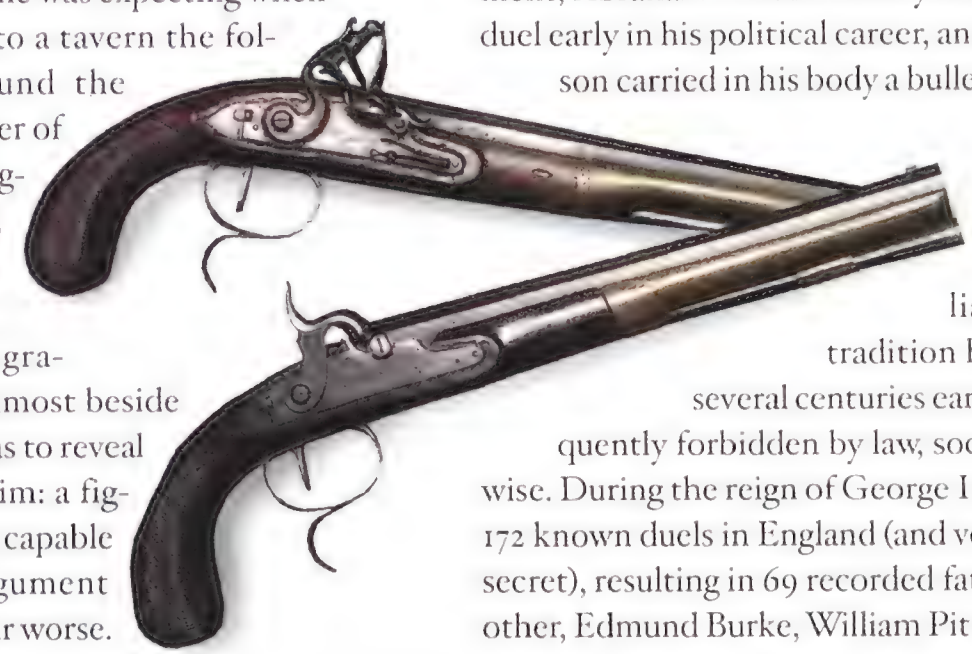
Defenders of honor or shoot-on-sight vigilantes? Even in 19th-century America, it was hard to tell

Duel!

BY ROSS DRAKE

THE STORY, AS PARSON WEEMS TELLS IT, is that in 1754 a strapping young militia officer named George Washington argued with a smaller man, one William Payne, who made up for the disparity in size by knocking Washington down with a stick. It was the kind of affront that, among a certain class of Virginia gentlemen, almost invariably called for a duel. That must have been what Payne was expecting when Washington summoned him to a tavern the following day. Instead, he found the colonel at a table with a decanter of wine and two glasses. Washington apologized for the quarrel, and the two men shook hands.

Whether or not this actually happened—and some biographers believe that it did—is almost beside the point. Weems' intention was to reveal Washington as he imagined him: a figure of profound self-assurance capable of keeping an overheated argument from turning into something far worse. At a time in America when the code of the duel was becoming a law unto itself, such restraint was not always apparent. Alexander Hamilton was the most celebrated casualty of the dueling ethic, having lost his life in an 1804 feud with Aaron Burr on the fields of Weehawken, New Jersey, but there were many more who paid the ultimate price—congressmen, newspaper editors, a signer of the Declaration of Independence (the otherwise obscure Button Gwinnett, famous largely for being named Button Gwinnett), two U.S. senators (Armistead T. Mason of Virginia and David C. Broderick of California) and, in 1820, the rising naval star Stephen Decatur. To his lasting embarrassment, Abraham Lincoln barely escaped being drawn into a duel early in his political career, and President Andrew Jackson carried in his body a bullet from one duel and some shot from a gunfight that followed another.



Not that private dueling was a peculiarly American vice. The tradition had taken hold in Europe several centuries earlier, and though it was frequently forbidden by law, social mores dictated otherwise. During the reign of George III (1760-1820), there were 172 known duels in England (and very likely many more kept secret), resulting in 69 recorded fatalities. At one time or another, Edmund Burke, William Pitt the younger and Richard Brinsley Sheridan all took the field, and Samuel Johnson defended the practice, which he found as logical as war between nations: "A man may shoot the man who invades his character," he once told biographer James Boswell, "as he may shoot him who attempts to break into his house." As late as 1829 the Duke of Wellington, then England's prime minister, felt com-

Dueling was accepted in Europe (right, illustrations from a c. 1789 British dueling manual) before it spread to the New World. The .544-caliber pistols (above) were employed with fatal consequences in America's most notorious face-off: 1804's Burr vs. Hamilton.

Fig. 29.

Position of the Disarm after having parried the Thrust in Tierce.

Fig. 30.

The disarm on the Carte or Second Thrust, after having parried with the Pri

Fig. 31.

of the Disarm on the Carte or 2nd Thrust after having parried with ſ prime Parade.

Fig. 32.

The Disarm after the Parade on the outside of the Si

Fig. 33.

n in Tierce after having parried with the Poignard

Fig 34

The Spanish Guard-defeated, after the attempt of the Cut on the

Fig. 35.

B

Fig. 36.

A

pelled to challenge the Earl of Winchelsea, who had accused him of softness toward Catholics.

In France, dueling had an even stronger hold, but by the 19th century, duels there were seldom fatal, since most involved swordplay, and drawing blood usually sufficed to give honor its due. (Perhaps as a way of relieving ennui, the French weren't averse to pushing the envelope in matters of form. In 1808, two Frenchmen fought in balloons over Paris; one was shot down and killed with his second. Thirty-five years later, two others tried to settle their differences by skulling each other with billiard balls.)

In the United States, dueling's heyday began at around the time of the Revolution and lasted the better part of a century. The custom's true home was the antebellum South. Duels, after all, were fought in defense of what the law would not defend—a gentleman's sense of personal honor—and nowhere were gentlemen more exquisitely sensitive on that point than in the future Confederacy. As self-styled aristocrats, and frequently slaveholders, they enjoyed what one Southern writer describes as a "habit of command" and an expectation of deference. To the touchiest among them, virtually any annoyance could be construed as grounds for a meeting at gunpoint, and though laws against dueling were passed in several Southern states, the statutes were ineffective. Arrests were infrequent; judges and juries were loath to convict.

Although dueling etiquette had been codified for centuries, combatants still tested the limits of form. Adversaries slung piles of dung, beaned each other with billiard balls and, as suggested in this 18th-century engraving, fought while suspended by balloons.

In New England, on the other hand, dueling was viewed as a cultural throwback, and no stigma was attached to rejecting it. Despite the furious sectional acrimony that preceded the Civil War, Southern congressmen tended to duel each other, not their Northern antagonists, who could not be relied upon to rise to a challenge. Consequently, when South Carolina congressman Preston Brooks was offended by Massachusetts senator Charles Sumner's verbal assault on the congressman's uncle, he resorted to caning Sumner insensible on the floor of the Senate. His constituents understood. Though Brooks was reviled in the North, he was lionized in much of the South, where he was presented with a ceremonial cane inscribed "Hit Him Again." (Brooks said he had used a cane rather than a horsewhip because he was afraid Sumner might wrestle the whip away from him, in which case Brooks would have had to kill him. He didn't say how.)

ROSS DRAKE is a former editor at People *magazine who now writes from Connecticut. This is his first article for* SMITHSONIAN.

Curiously, many who took part in the duel professed to disdain it. Sam Houston opposed it, but as a Tennessee congressman, shot Gen. William White in the groin. Henry Clay opposed it, but put a bullet through Virginia senator John Randolph's coat (Randolph being in it at the time) after the senator impugned his integrity as secretary of state and called him some colorful names. Hamilton opposed dueling, but met Aaron Burr on the same ground in New Jersey where Hamilton's eldest son, Philip, had died in a duel not long before. (Maintaining philosophical consistency, Hamilton intended to hold his fire, a common breach of strict dueling etiquette that, sadly, Burr didn't emulate.) Lincoln, too, objected to the practice, but got as far as a dueling ground in Missouri before third parties intervened to keep the Great Emancipator from emancipating a future Civil War general.

So why did such rational men choose combat over apology or simple forbearance? Perhaps because they saw no alternative. Hamilton, at least, was explicit. "The ability to be in future useful," he wrote, " . . . in those crises of our public affairs which seem likely to happen . . . imposed on me (as I thought) a peculiar necessity not to decline the call." And Lincoln, though dismayed to be called to account for pricking the vanity of a political rival, couldn't bring himself to extend his regrets. Pride obviously had something to do with this, but pride compounded by the imperatives of a dueling society. For a man who wanted a political future, walking away from a challenge may not have seemed a plausible option.

The Lincoln affair, in fact, affords a case study in how these matters were resolved—or were not. The trouble began when Lincoln, then a Whig representative in the Illinois legislature, wrote a series of satirical letters under the pseudonym Rebecca, in which he made scathing fun of State Auditor James Shields, a Democrat. The letters were published in a newspaper, and when Shields sent him a note demanding a retraction, Lincoln objected to both the note's belligerent tone and its assumption that he had written more of them than he had. (In fact, Mary Todd, not yet Lincoln's wife, is believed to have written one of the letters with a friend.) Then, when Shields asked for a retraction of the letters he *knew* Lincoln had written, Lincoln refused to do so unless Shields withdrew his original note. It was a lawyerly response, typical of the verbal fencing that often preceded a duel, with each side seeking the moral high ground. Natu-

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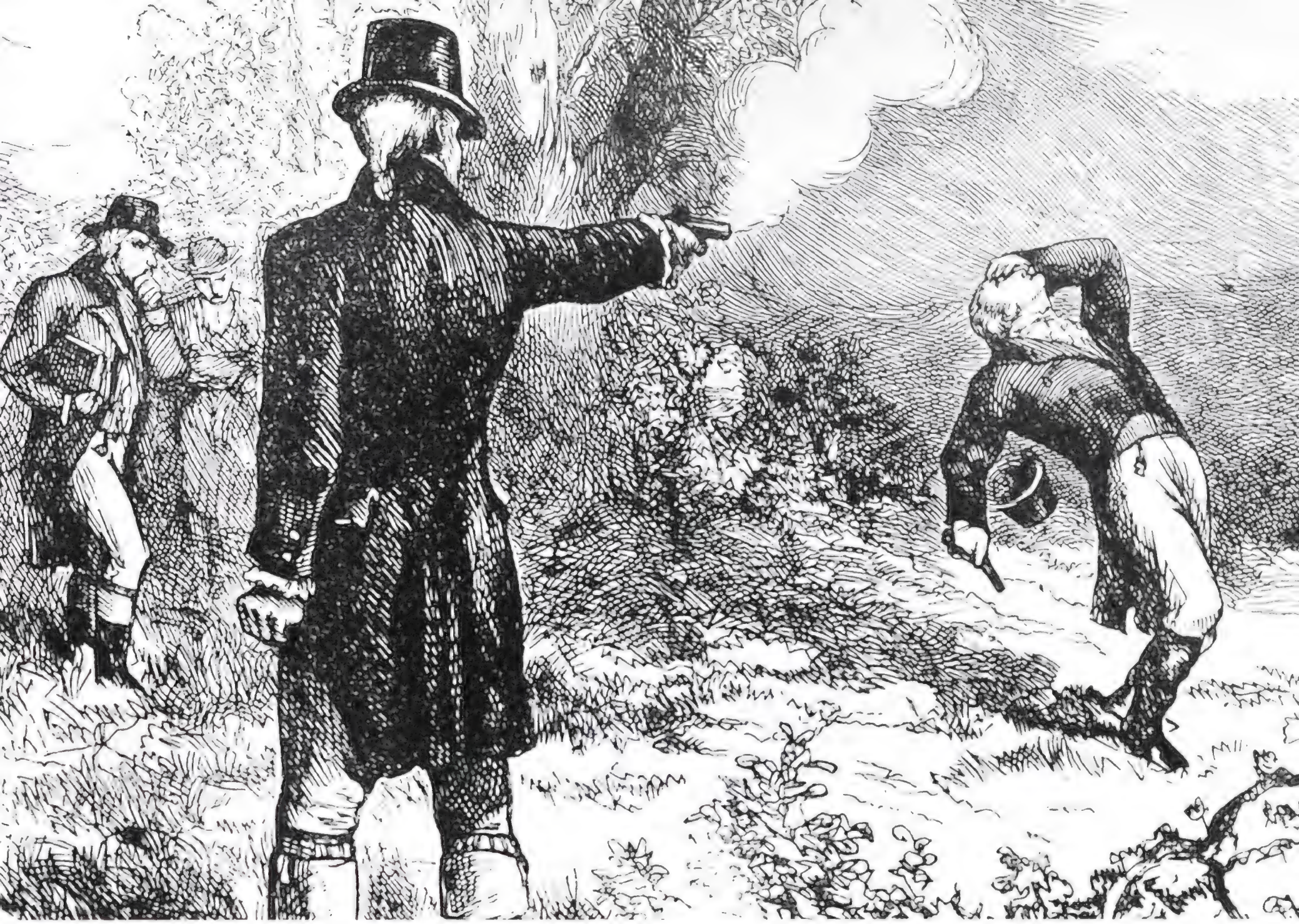


On July 11, 1804, U.S. vice president Aaron Burr mortally wounded his political rival, Alexander Hamilton, in Weehawken, New Jersey. Burr believed that shooting Hamilton would enhance his reputation, but the act branded him as a murderer and a villain.

rally, it led to a stalemate. By the time Lincoln agreed to a carefully qualified apology provided that first note was withdrawn—in effect asking Shields to apologize for demanding an apology—Shields wasn't buying. When Lincoln, as the challenged party, wrote out his terms for the duel, hopes for an accommodation seemed ended.

The terms themselves were highly unusual. Shields was a military man; Lincoln was not. Lincoln had the choice of weapons, and instead of pistols chose clumsy cavalry broadswords, which both men were to wield while standing on a narrow plank with limited room for retreat. The advantage would obviously be Lincoln's; he was the taller man, with memorably long arms. "To tell you the truth," he told a friend later, "I did not want to kill Shields, and felt sure that I could disarm him . . . ; and, furthermore, I didn't want the damned fellow to kill me, which I rather think he would have done if we had selected pistols."

Fortunately, perhaps for both men, and almost certainly for one of them, each had friends who were determined to keep them from killing each other. Before Shields arrived at the dueling spot, their seconds, according to Lincoln biographer Douglas L. Wilson, proposed that the dispute be submitted to a group of fair-minded gentlemen—an arbitration panel of sorts. Though that idea didn't fly, Shields' seconds soon agreed not to stick at the sticking point. They withdrew their man's first note on their own, clearing the way for a settlement. Shields went on to become a United States senator and a brigadier general in the Union Army; Lincoln went on to be Lincoln. Years later, when the matter was brought up to the president, he was adamant. "I do not deny it," he told an Army officer who had referred to the incident, "but if you desire my friendship, you will never mention it again."

If Lincoln was less than nostalgic about his moment on the field of honor, others saw dueling as a salutary alternative to simply gunning a man down in the street, a popular but déclassé undertaking that might mark a man as uncouth. Like so many public rituals of the day, dueling was, in concept at least, an attempt to bring order to a dangerously loose-knit society. The Englishman Andrew Steinmetz, writing about dueling in 1868, called America "the country where life is cheaper than anywhere else." Advocates of the duel would have said that life would have been even cheaper with-

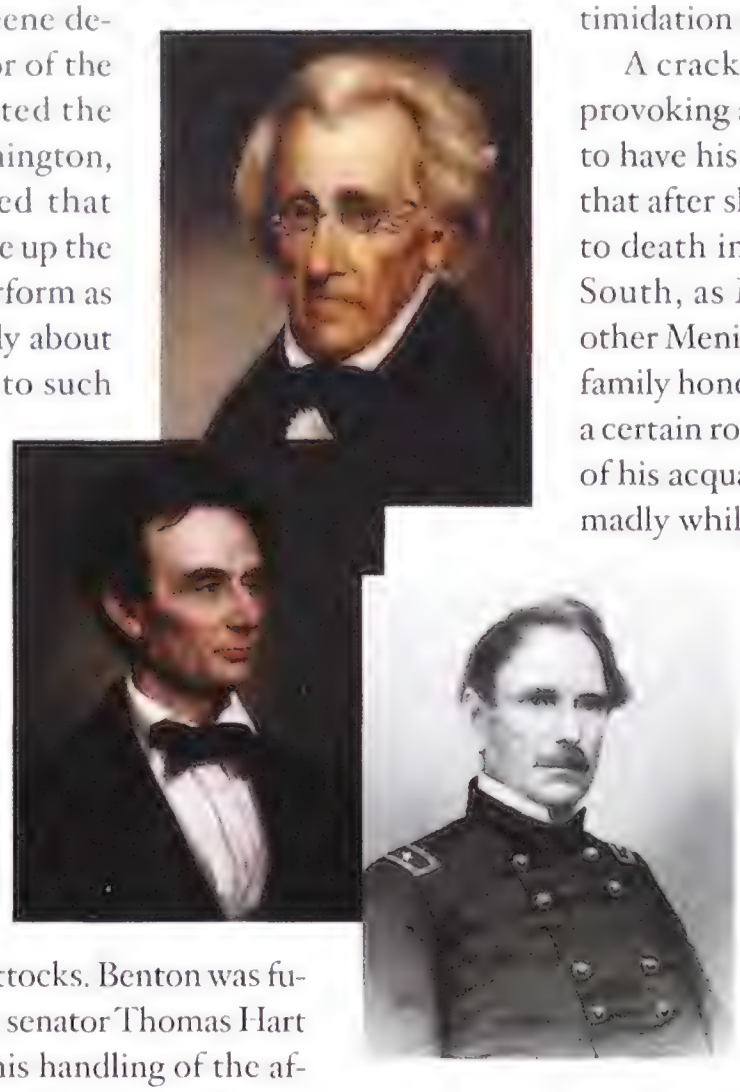
out it. Of course, the attitudes dueling was meant to control weren't always controllable. When Gen. Nathanael Greene, a Rhode Islander living in Georgia after the Revolution, was challenged by Capt. James Gunn of Savannah regarding his censure of Gunn during the war, Greene declined to accept. But feeling the honor of the Army might be at stake, he submitted the matter to George Washington. Washington, who had no use for dueling, replied that Greene would have been foolish to take up the challenge, since an officer couldn't perform as an officer if he had to worry constantly about offending subordinates. Indifferent to such logic, Gunn threatened to attack Greene on sight. Greene mooted the threat by dying peacefully the following year.

Even more than Captain Gunn, Andrew Jackson was an excitable sort with a famously loose rein on his temper. A survivor—barely—of several duels, he nearly got himself killed following a meeting in which he was merely a second, and in which one of the participants, Jesse Benton, had the misfortune to be shot in the buttocks. Benton was furious, and so was his brother, future U.S. senator Thomas Hart Benton, who denounced Jackson for his handling of the affair. Not one to take denunciation placidly, Jackson threatened to horsewhip Thomas and went to a Nashville hotel to do it. When Thomas reached for what Jackson supposed was his pistol, Jackson drew his, whereupon the irate Jesse burst through a door and shot Jackson in the shoulder. Falling, Jackson fired at Thomas and missed. Thomas returned the favor, and Jesse moved to finish off Jackson. At this point, several other men rushed into the room, Jesse was pinned to the floor and stabbed (though saved from a fatal skewering by a coat button), a friend of Jackson's fired at Thomas, and Thomas, in hasty retreat, fell backward down a flight of stairs. Thus ended the Battle of the City Hotel.

It was just this sort of thing that the code of the duel was meant to prevent, and sometimes it may have actually done so. But frequently it merely served as a scrim giving cover to murderers. One of the South's most notorious duelists was a hard-drinking homicidal miscreant named Alexander Keith McClung. A nephew of Chief Justice John Marshall—though likely not his favorite nephew, after engaging in a duel with a cousin—McClung behaved like a character out of Gothic fiction, dressing from time to time in a flowing cape, giving overripe oratory and morbid poetry, and terrifying many of his fellow Mississippians with his penchant for intimidation and violence.

A crack shot with a pistol, he preferred provoking a challenge to giving one, in order to have his choice of weapons. Legend has it that after shooting Vicksburg's John Menifee to death in a duel, the Black Knight of the South, as McClung was known, killed six other Menifees who rose in turn to defend the family honor. All of this reportedly generated a certain romantic excitement among women of his acquaintance. Wrote one: "I loved him madly while with him, but feared him when away from him; for he was a man of fitful, uncertain moods and given to periods of the deepest melancholy. At such times he would mount his horse, Rob Roy, wild and untamable as himself, and dash to the cemetery, where he would throw himself down on a convenient grave and stare like a madman into the sky. . . ." (The woman refused his proposal of marriage; he didn't seem the domestic type.) Expelled from the Navy as a young man, after threatening the lives of various shipmates, McClung later served, incredibly, as a U.S. marshal and fought with distinction in the Mexican War. In 1855, he brought his drama to an end, shooting himself in a Jackson hotel. He left behind a final poem, "Invocation to Death."

Though the dueling code was, at best, a fanciful alternative to true law and order, there were those who believed it indispensable, not only as a brake on shoot-on-sight justice but as a way of enforcing good manners. New Englanders may have prided themselves on treating an insult as only an insult, but to the South's dueling gentry, such indifference betrayed a lack of good breeding. John Lyde Wilson, a former governor of South Carolina who was the foremost codifier of dueling rules in America, thought it downright unnatural. A high-minded gentleman



Challengers and the challenged crossed social and party lines. Some of the better known included, from top: Andrew Jackson (c. 1840), Abraham Lincoln (c. 1860), politician James Shields (c. 1865), Henry Clay (c. 1842) and naval hero Stephen Decatur (c. 1814).

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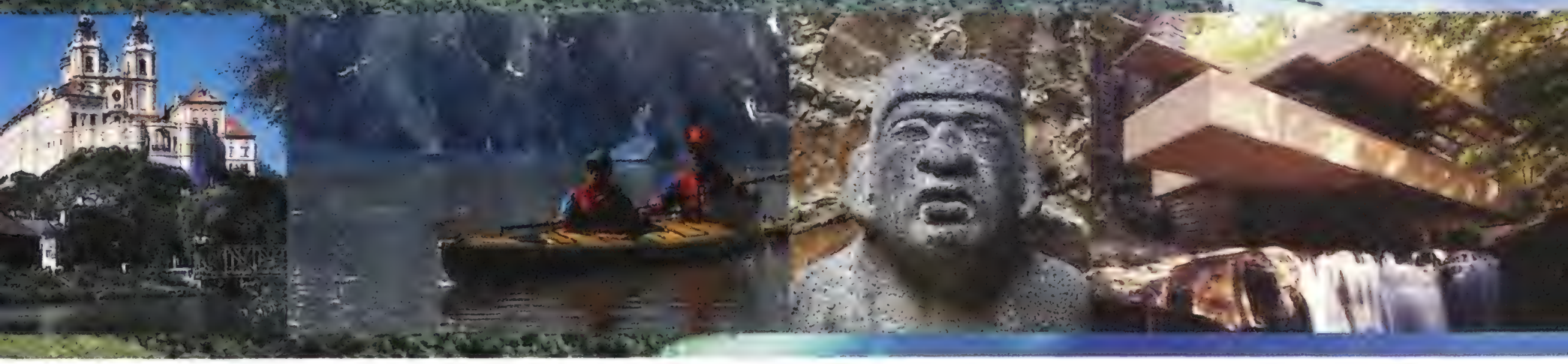

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Affairs of honor during 19th-century America were usually the province of Southern males of a certain class. Though rare, there are also several recorded cases of female duelists (above, a c. 1886 resolution of a domestic dispute in Red Ledge, Idaho).

who believed the primary role of a second was to keep duels from happening, as he had done on many occasions, he also believed that dueling would persist "as long as a manly independence and a lofty personal pride, in all that dignifies and ennobles the human character, shall continue to exist."

Hoping to give the exercise the dignity he felt sure it deserved, he composed eight brief chapters of rules governing everything from the need to keep one's composure in the face of an insult ("If the insult be in public . . . never resent it there") to ranking various offenses in order of precedence ("When blows are given in the first instance and returned, and the person first striking be badly beaten or otherwise, the party first struck is to make the demand [for a duel or apology], for blows do not satisfy a blow") to the rights of a man being challenged ("You may refuse to receive a note from a minor. . . , [a man] that has been publicly disgraced without resenting it. . . , a man in his dotage [or] a lunatic").

Formal dueling, by and large, was an indulgence of the South's upper classes, who saw themselves as above the law—or at least some of the laws—that governed their social inferiors. It would have been unrealistic to expect them to be bound by the letter of Wilson's rules or anyone else's, and of course they were not. If the rules specified smoothbore pistols, which could be mercifully inaccurate at the prescribed distance of 30 to 60 feet, duelists might choose rifles or shotguns or bowie knives, or confront each other, suicidally, nearly muzzle to muzzle. If Wilson was emphatic that the contest should end at first blood ("no second is excusable who permits a wounded friend to fight"), contestants might keep on fighting, often to the point where regret was no longer an option. And if seconds were obliged to be peacemakers, they sometimes behaved more like promoters.

But if bending the rules made dueling even bloodier than it had to be, strict adherence could be risky too. Some would-be duelists discovered that even the code's formal preliminaries might set in motion an irreversible chain of events. When, in 1838, Col. James Watson Webb, a thuggish Whig newspaper editor, felt himself abused in Congress by Representative Jonathan Cilley, a Maine Democrat, he dispatched Representative William Graves of Kentucky to deliver his demand for an apology. When Cilley declined to accept Webb's note, Graves, following what one Whig diarist

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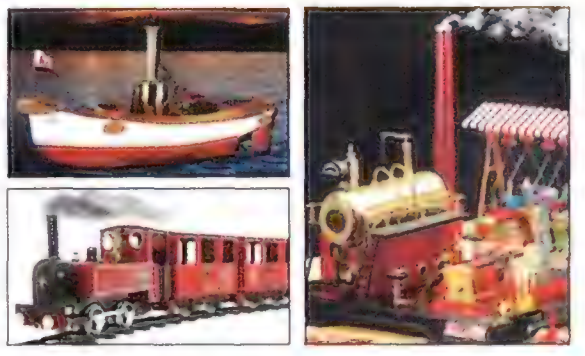

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described as "the ridiculous code of honor which governs these gentlemen," felt obliged to challenge Cilley himself. Subsequently, the two congressmen, who bore each other not the slightest ill will, adjourned to a field in Maryland to blast away at each other with rifles at a distance of 80 to 100 yards. After each exchange of shots, negotiations were conducted with a view to calling the whole thing off, but no acceptable common ground could be found, though the issues still at stake seemed appallingly trivial. Graves' third shot struck Cilley and killed him.

Though President Van Buren attended Cilley's funeral, the Supreme Court refused to be present as a body, as a protest against dueling, and Graves and his second, Representative Henry Wise of Virginia, were censured by the House of Representatives. On the whole, though, outrage seemed to play out along party lines, with Whigs less dismayed by the carnage than Democrats. Congressman Wise, who had insisted the shooting continue, over the protests of Cilley's second, was particularly defiant. "Let Puritans shudder as they may," he cried to his Congressional colleagues. "I belong to the class of Cavaliers, not to the Roundheads."

Ultimately, the problem with dueling was the obvious one. Whatever rationale its advocates offered for it, and however they tried to refine it, it still remained a capricious waste of too many lives. This was especially true in the Navy, where boredom, drink and a mix of spirited young men in close quarters on shipboard produced a host of petty irritations ending in gunfire. Between 1798 and the Civil War, the Navy lost two-thirds as many officers to dueling as it did to more than 60 years of combat at sea. Many of those killed and maimed were teenage mid-

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shipmen and barely older junior officers, casualties of their own reckless judgment and, on at least one occasion, the by-the-book priggishness of some of their shipmates.

In 1800, Lt. Stephen Decatur, who was to die in a celebrated duel 20 years later, laughingly called his friend Lieutenant Somers a fool. When several of his fellow officers shunned Somers for not being suitably resentful, Somers explained that Decatur had been joking. No matter. If Somers didn't challenge, he would be branded a coward and his life made unbearable. Still refusing to fight his friend Decatur, Somers instead challenged each of the officers, to be fought one after another. Not until he had wounded one of them, and been so seriously wounded himself that he had to fire his last shot from a sitting position, would those challenged acknowledge his courage.

The utter pointlessness of such encounters became, in time, an insult to public opinion, which by the Civil War had become increasingly impatient with affairs of honor that ended in killing. Even in dueling's heyday, reluctant warriors were known to express reservations about their involvement by shooting into the air or, after receiving fire, not returning it. Occasionally they chose their weapons—howitzers, sledgehammers, forkfuls of pig dung—for their very absurdity, as a way of making a duel seem ridiculous. Others, demonstrating a "manly independence" that John Lyde Wilson might have admired, felt secure enough in their own reputations to turn down a fight. It may not have been difficult, in 1816, for New Englander Daniel Webster to refuse John Randolph's challenge, or for a figure as unassailable as Stonewall Jackson, then teaching at the Virginia Military Institute, to order court-martialed a cadet who challenged him over a supposed insult during a lecture. But it must have been a different matter for native Virginian Winfield Scott, a future commanding general of the Army, to turn down a challenge from Andrew

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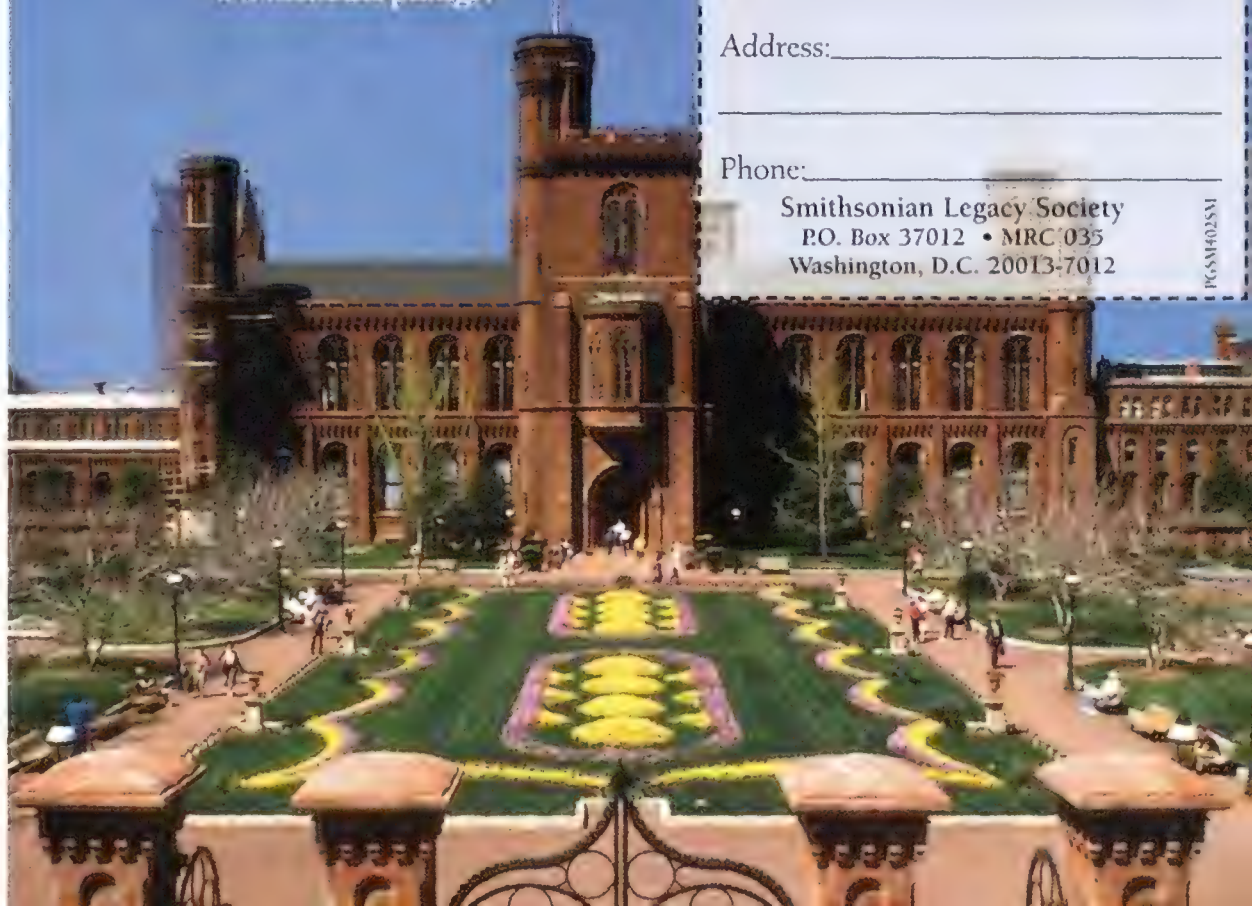

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Jackson after the War of 1812. (Jackson could call him whatever he chose, said Scott, but he should wait until the next war to find out if Scott were truly a coward.) And it had to be riskier still for Louisville editor George Prentice to rebuke a challenger by declaring, "I do not have the least desire to kill you. . . . and I am not conscious of having done anything to entitle you to kill me. I do not want your blood upon my hands, and I do not want my own on anybody's. . . . I am not so cowardly as to stand in dread of any imputation on my courage."

If he did not stand in such dread, others did, since the consequences of being publicly posted as a coward could ruin a man. Yet even in dueling's heartland south of the Mason-Dixon line, the duel had always had its opponents. Anti-dueling societies, though ineffectual, existed throughout the South at one time, and Thomas Jefferson once tried in vain to introduce in Virginia legislation as strict—though surely not so imaginative—as that in colonial Massachusetts, where the survivor of a fatal duel was to be executed, have a stake driven through his body, and be buried without a coffin.

But time was on the side of the critics. By the end of the Civil War, the code of honor had lost much of its force, possibly because the country had seen enough bloodshed to last several lifetimes. Dueling was, after all, an expression of caste—the ruling gentry deigned to fight only its social near-equals—and the caste whose conceits it had spoken to had been fatally injured by the disastrous war it had chosen. Violence thrived; murder was alive and well. But for those who survived to lead the New South, dying for chivalry's sake no longer appealed. Even among old dueling warriors, the ritual came to seem like something antique. Looking back on life's foolishness, one South Carolina general, seriously wounded in a duel in his youth, was asked to recall the occasion. "Well I never did clearly understand what it was about," he replied, "but you know it was a time when all gentlemen fought." ○

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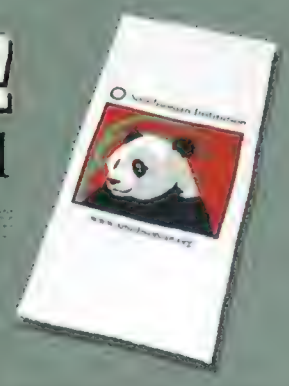

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Zoo Story

Independent and determined, biologist and former circus performer Sharon Matola takes pride in "the Best Little Zoo in the World" ~ BY ADELE CONOVER

"She's a little spoiled," says Matola of Angel, the three-legged jaguar she rescued from a neglectful mother and raised by hand.

"I was dropped into the jungle with ten guys for two weeks without food, water or a knife," says Matola. "For the first day the guys were very protective of me, but soon it was every 'man' for himself. I didn't mind . . . but some of the guys didn't do so well. One refused to eat at all."

WEARING ONE OF HER signature hand-tailored jumpsuits, Sharon Matola vaults the Belize Zoo's "Do Not Enter" back gate with the élan of Xena, Warrior Princess. We are headed to Matola's office, a well-hidden cottage set on stilts amid the zoo's thick, tropical vegetation.

"And now you'll meet my office assistant, Angel," says Matola, 49, director and founder of the Belize Zoo, a.k.a. "the Best Little Zoo in the World." Inside the one-room wooden building, Angel's golden eyes glow. The three-legged jaguar watches us from her floor-to-ceiling cage, which opens onto a quarter-acre outdoor enclosure.

Like a huge tabby, Angel bows. "She wants to play," says Matola. "I hand raised her because she was neglected by her captive mother. The vet had to amputate her left front leg because of an infection. She's a little spoiled, but she loves company. You can pat her," Matola tells me. "Just rub her

head with the back of your hand." Dutifully, I sidle closer, but Angel reaches through the cage with her muscular foreleg, grabs a nearby chair and slams it against the wire enclosure. I back away. "You are a jaguar," says Matola in a soothing tone to the cat—not that I need reminding.

Matola has trained lions and tigers to jump through fiery circus hoops; tracked wild jaguars in Belize's Maya Mountains; and minded exotic animals during the filming of *The Mosquito Coast*, which starred Harrison Ford. And she seems to have had nine lives, or at least that many careers. Matola's gigs—so far—include U.S. Air Force airman, biologist, circus performer, animal trainer, explorer, environmentalist, disc jockey and director of the Belize Zoo.

Born in Baltimore, Maryland, the daughter of a brewery manager and an administrative secretary, Matola, who is single, was charting her own course by junior high school. Or trying to. "I wanted to take shop, but I was stuck taking a home economics course," she says. For the final exam, she was required to make an A-line dress from scratch. "I paid a classmate three dollars to sew the damned dress," she says. But the stitches were too neat, and the teacher was suspicious. Matola confessed, and punishment was swift—she received a failing grade for the quarter.

After high school, she joined the U.S. Air Force and was recruited into its survival training program. "I was dropped into the Panamanian jungle with ten guys for two weeks without food, water or a knife," she says. "For the first day the guys were very protective of me, but soon it was every 'man' for himself. Considering the alternative, I didn't mind catching and eating lizards, snakes and bugs, and drinking bad water, but some of the guys didn't do so well. One refused to eat at all." She spent the remainder of her two-and-a-half-year hitch training recruits in survival techniques.

Taking advantage of the G.I. Bill in 1975, Matola, then 21, enrolled in the University of Iowa, where she studied Russian. In 1978, she transferred to the New College of Florida in Sarasota and became a biology major. While in graduate school, where she focused on mycology (the study of fungi), she spotted a newspaper ad seeking a "tall white woman" to dance in a Mexican circus. Why not? As she says, "I love to dance, and it was a chance to travel free throughout Mexico, collecting fungi in the countryside and markets as part of my graduate fieldwork."

Duly hired by the Suarez Brothers Circus, Matola spent her nights dancing (and leading the circus parade astride an elephant) in a sequined ensemble and three-foot-high headdress; "taming" four lions and six tigers in a gold lamé outfit; and chasing clowns around in a bear suit. During the day she pursued her beloved fungi.

Matola liked to give treats to the circus animals—ten big

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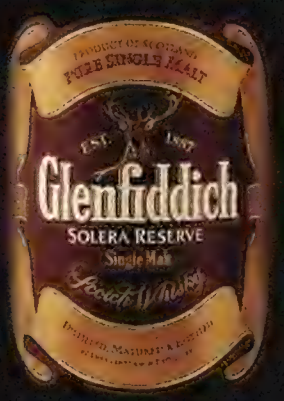

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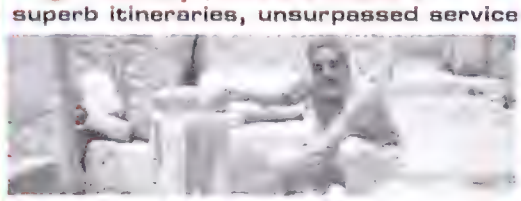

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After graduation, Matola spotted an ad seeking a "tall white woman" to dance in a circus. "It was a perfect life," she says.

Matola (at 27 in 1981) wore gold lamé to train lions and tigers in a Mexican circus.

cats, three elephants, three chimps, a zebra and a camel. She dispensed the goodies from a brown paper bag. "One day, Tabo, a male African elephant, saw me coming, but this time my paper bag held shampoo and creme rinse. As I walked past him, he lunged out and grabbed the bag and was about to down the contents! I didn't want to lose my shampoo, and I thought, 'Oh my God, he'll get sick or choke on the plastic bottles,' so I tried to grab the bag back." But the elephant picked up Matola with his trunk and slammed her to the ground. "I thought he was

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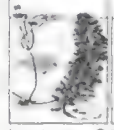

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going to kill me," she says, "although from his perspective he was actually behaving naturally for an angry bull elephant." Matola escaped with several bruised ribs and, remarkably, with her love for the circus intact. "It was a perfect life," she says, "but after a year, it was time to move on."

In 1982, filmmaker Richard Foster—who was working on a wildlife documentary in Belize—hired Matola to handle some 20 captive animals that were being used in the movie. After the film was finished, Foster moved on to another project, and Matola was left with the animals, which lived in the filmmaker's wooded, several-acre backyard, 29 miles west of Belize City. The menagerie—two jaguars, an anteater, a margay, several peccaries and parrots, a Baird's tapir (Belize's national animal) and other creatures—were far too tame to return to the wild. So, to support them, Matola raised chickens. Twice a month, carrying 80 or so pounds of fresh chicken meat, she would hop on her Yamaha motorcycle to deliver the goods to resorts and restaurants in Belize City. She also wrote up factual blurbs about the various animals, tacked them to the cages and began charging a small admission fee. Thus Foster's backyard became the first Belize Zoo.

With the approval of the Belizean government, Matola began visiting schools throughout the country—a boa constrictor in tow—teaching kids about Belize's native animals. In 1984, she talked the regional Taca Airlines into giving her a ticket to Miami so she could attend the American Zoo and Aquarium Association annual meeting.

Matola arrived at the convention center wearing a purple jumpsuit with the words "The Belize Zoo" embroidered on a pocket. She set up an "office" behind an Out Of Order sign she put on a stall in a basement ladies' room. "There I could wash, store my stuff, regroup and plot my next move."

Resplendent in purple, Matola was listening to a talk about diets for small zoo carnivores when the man next to her whispered, "Let's go outside and

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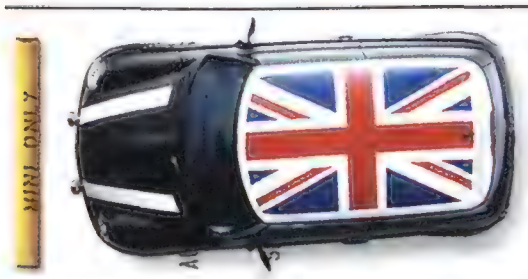

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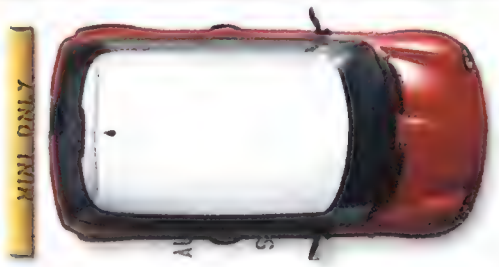

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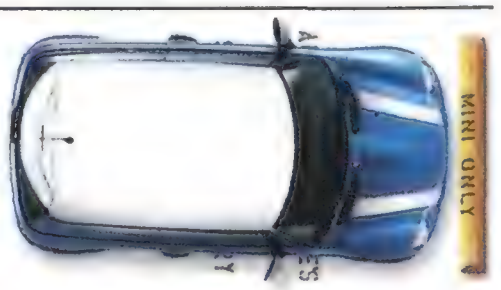

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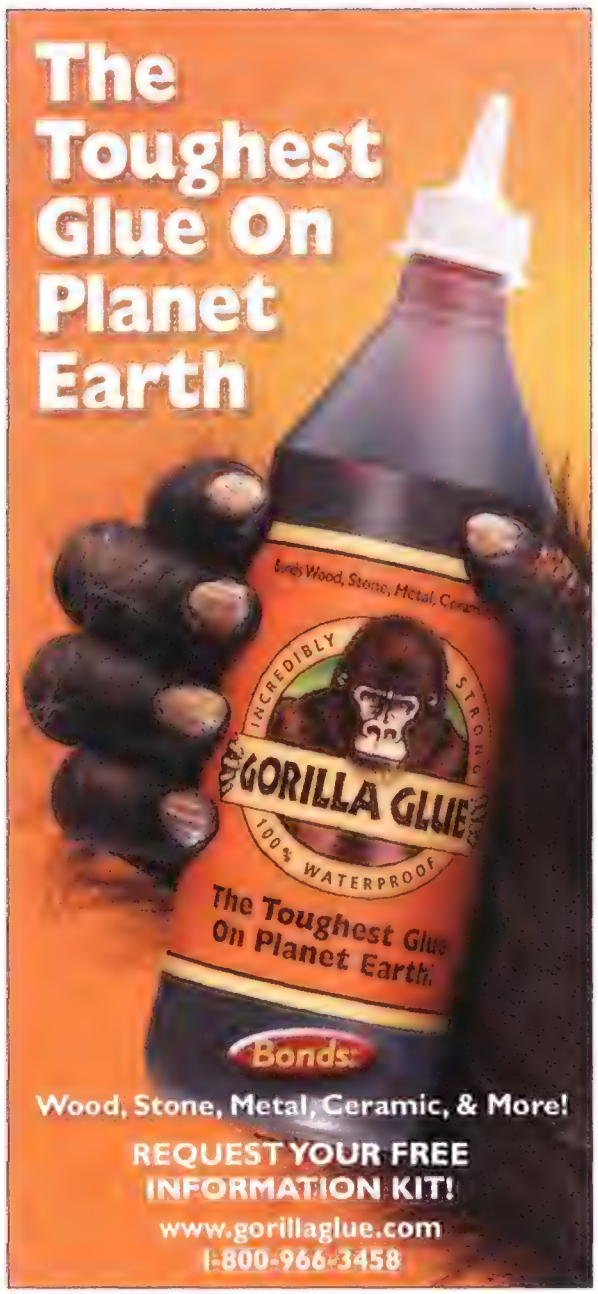

talk about the Belize Zoo." As it happened, the man was Seattle architect Johnpaul Jones. Four months later, Jones visited Belize and, impressed with Matola's determination, volunteered to design a new zoo for her at no charge. Matola also won over naturalist and writer Gerald Durrell. "Gerry," says his zoologist widow, Lee Durrell, "adored and admired Sharon." With additional support from the Durrells, as well as funds from the Wildlife Trust, actor Harrison Ford, songwriter Jimmy Buffet and others, the new zoo was completed in 1991.

Located not far from Foster's backyard, on land purchased from a local resident, today's zoo is a 29-acre oasis of tropical vegetation, ponds and enclosures housing more than 100 indigenous animals—gifts from other zoos, refugees from the ranks of the captive-bred or pet world, and injured animals from the wild. It employs a staff of 25, all Belizeans.

Matola's hand-painted signs, posted throughout the zoo, range from the cautionary—"If you value your body parts, keep them out of the enclosures"—to the whimsical: "We parrots believe in two things: 1) Don't spit in the wind and 2) Always love your mother." The cage environments are so natural that the animals are hard, at first, to spot. On the day that I visited, Bullethead, a 200-pound Baird's tapir who lost an eye to a gunshot wound, ambled over and aimed an "affectionate" squirt at Matola. "Hey! It's not nice to pee on the director," she protested.

Although the zoo sells some 60,000 tickets each year (at 50 cents to $7.50), admission revenues don't come close to meeting its $1 million budget, which means Matola spends a good bit of her time fundraising. But for two hours twice a week, she broadcasts a steady throb of talk and music from station BFBS on Price Barracks in Ladyville, Belize.

"I can't believe I get paid to do this!" she says off the air, then segues into Fatboy Slim's rendition of "Sunset (Bird of Prey)," which she dedicates to a harpy eagle named Panama, a gift

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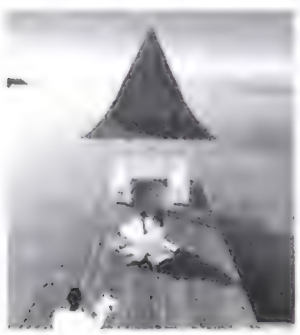

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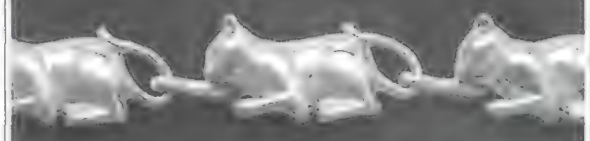

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"I can't believe I get paid to do this!" Matola says of her gig as a radio disc jockey.

Matola (with friend Tony Garel) leads the opposition to a hydroelectric dam.

from the Peregrine Fund's Neotropical Raptor Center in Panama, who's scheduled to make his formal debut at the zoo the next day.

As if raising money for and running the zoo, and her radio gigs, were not enough to keep her busy, since 1999 Matola has been leading the opposition to the construction of a controversial hydroelectric dam in Belize's Macal River Valley, home to endangered species such as jaguars and the fewer than 200 remaining members of a rare subspecies of scarlet macaw.

Citing studies that note potentially serious environmental damage and the submergence of unexcavated Maya ruins if the dam gets built, Matola and the Belize Alliance of Conservation Non-Government Organizations filed suit against the Belize government and electricity company in February 2002 to stop the project. A final ruling in January upheld the approval of the dam. But "Sharon is like Panama, the harpy eagle," says a government official in favor of the dam. "Once she gets her talons into you, she does not let go." ○

A frequent contributor, freelance writer ADELE CONOVER *is based in Arizona.*

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Rockefeller Center symbolizes the heart of Manhattan – REVIEWED BY OWEN EDWARDS

GREAT FORTUNE: THE EPIC OF ROCKEFELLER CENTER

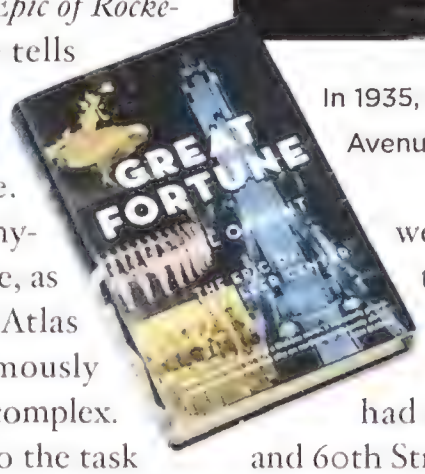
DANIEL OKRENT

Viking, $29.95

In 1935, poet Gertrude Stein wrote: "The view of Rockefeller Center from Fifth Avenue is the most beautiful thing I have ever seen ever seen ever seen."

IN ALL LIKELIHOOD many decades from now, the day will come when New York will no longer be the most powerful city in the world. At that time, the citizens of this mighty metropolis, like modern Athenians looking up at the Acropolis, will be reminded of the years of power and glory by the great structures that serve as exclamation points on Manhattan's skyline. For obvious reasons, the Empire State Building—once again, through tragic circumstances, the dominant structure on the city's skyline—will inspire the collective thought that "those were the days," with the Chrysler Building playing a similar evocative role. Those are great single spires, definitive skyscrapers.

But a significant number of true New Yorkers might choose as America's acropolis the several buildings, plazas, and roof gardens that make up Rockefeller Center. Daniel Okrent, a former editor of *Life* magazine and today the first public editor of the *New York Times*, has written a delightful and exhaustive (but never exhausting) book, *Great Fortune: The Epic of Rockefeller Center*, in which he tells the dazzling, complex story of how New York's acropolis came to be. Okrent's subtitle is not hyperbole; this is an epic tale, as mythic as the statues of Atlas and Prometheus that famously hold court in the revered complex. It requires an author up to the task of telling it. From the very first sentence of the book's prologue, we know we are in good hands. "All the men entering the gleaming marble hall of the Metropolitan Club had arrived at Fifth Avenue and 60th Street on the wings of their wealth," Okrent writes.



But it took more than the wings of wealth to raise the great project into Manhattan's sky. Also essential were the thrust of power, the lift of influence, the energy of competing egos. No small part of the mix was architectural and organizational brilliance, for which we can all be everlastingly grateful. In the beginning, the saga of Rockefeller Cen-

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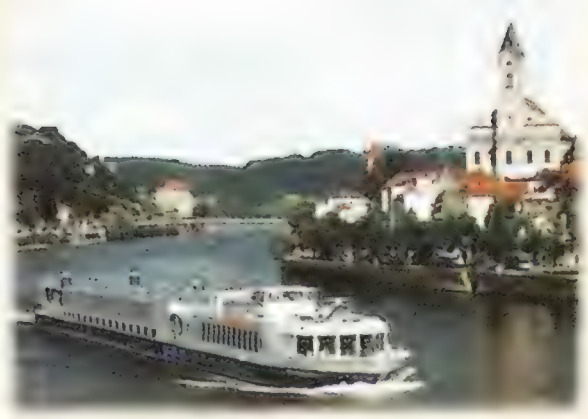
ter began with a piece of land, about 20 acres or so, in what is now Midtown. It is, in that sense, a typical story of Manhattan, where land is limited and the struggle for real estate is the moral equivalent of war—though morality very rarely comes into it.

The acreage on which the center was eventually built, with construction beginning in the fall of 1931, was originally part of the Common Lands assembled by Dutch governor Peter Minuit in 1624. In 1801, one David Hosack, a professor at the College of Physicians and Surgeons (precursor to Columbia Medical School) who was a friend to both Alexander Hamilton and Aaron Burr, purchased the parcel from the city of New York for the equivalent of $5,000. Hosack spent a fortune (his wife's, actually) to create a walled garden in which to raise medicinal plants. At the time, Hosack's garden lay so far north of the city proper that, as Okrent puts it, with a touch of Manhattan condescension, it "might as well have been in Poughkeepsie."

Eleven acres of the plot eventually became the property of Columbia College, was turned into a fairly tawdry mix of small business and residential brownstones in the early 20th century, and at that time, began leasing out the land to help Columbia pay for its new campus on Morningside Heights. Part of the site was considered as a new location for the Metropolitan Opera. That deal foundered for reasons as byzantine as they are riveting, but it gave birth to the idea of a complex of theatres, stores and office space that would stretch from elegant Fifth Avenue all the way to Sixth, dark and noisy under its elevated train line.

Eventually, John D. Rockefeller Jr. entered the picture with his great fortune (and the desire to make it even larger). David Sarnoff, the ambitious new head of fast-growing RCA, brought his company in as a potential major lessee, and a team of five notable architects was assembled under the organizational leadership of developer John R. Todd and the aesthetic direction of Ray Hood, designer of the McGraw-Hill



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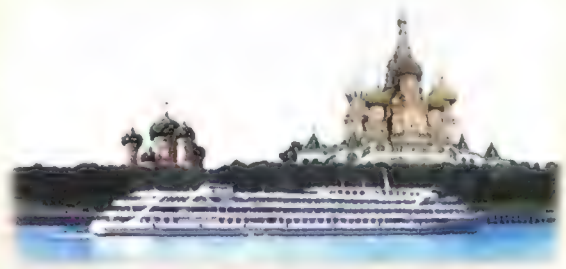

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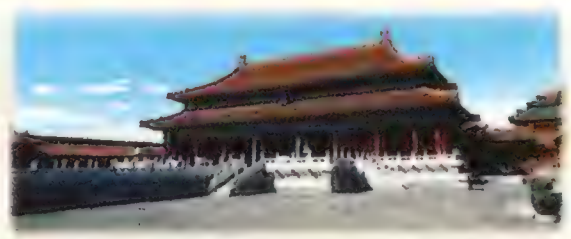

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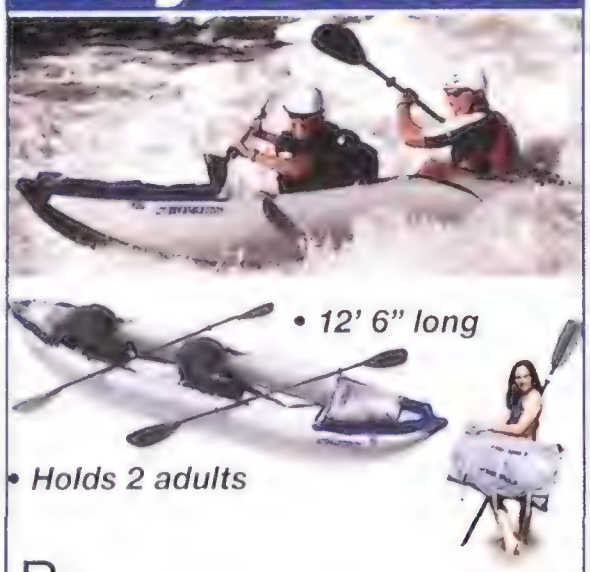

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The Rockettes (onstage at Radio City Music Hall, 1958) epitomize showgirl glitz.

Building on 42nd Street. In the summer of 1930, plans for Rockefeller Center finally began to take shape.

At this point in the story, we are only one-third of the way through Okrent's book, and not a page that follows is any less fascinating than what has gone before. The author spares neither himself nor us even the most minor detail. For which we can thank him, since there don't appear to be any details that seem in the end to be minor.

Okrent's cast of characters might have populated Henry James' biggest, unwritten novel. But it's the result of their monumental efforts that remain with us today. From the joyful Deco flamboyance of Radio City Music Hall to the elemental inevitability of the Modernist RCA tower, the complex was as innovative as it was impeccable, as smart as a business venture as it was eloquent as an artistic statement. The author puts it this way: "It is one of those expressions of architecture that, after seven decades, seems so natural it's hard to comprehend how revolutionary it was." In his epilogue, Okrent quotes one of the best writers about New York, Brendan Gill: "Rockefeller Center amounts to an extended family of buildings none of which, though they grow older, appears to grow old."

OWEN EDWARDS, for many years a New Yorker, now resides in San Francisco.

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SELF-PORTRAIT WITH TURTLES

DAVID M. CARROLL

HOUGHTON MIFFLIN, $22

ON A JUNE AFTERNOON in Connecticut in 1950, when David Carroll was 8 years old, he tramped into the woods near his house. Intrigued by a curious rustling from a patch of spiky sedge, he came face to face with his first wild turtle. There was, as he says, no turning back: "I didn't even need a map," he writes. "I was *home*."

Carroll carried that passionate interest in creatures of forest and fen—and turtles in particular—into adulthood, as he pursued a career as a painter and natural history illustrator. In the 1960s, he moved with his family to New Hampshire, where Carroll began writing the first of the volumes he refers to as his "Wet Sneaker Trilogy": *The Year of the Turtle* (1991), *Trout Reflections* (1993) and *Swampwalker's Journal* (1999). Today, those works have become acknowledged classics in literature of the environment; in *Self-Portrait with Turtle* he proves himself a master of the memoir as well.

The considerable charm of Carroll's autobiography rests, in large measure, on his artful acknowledgement of the debt he owes to those who helped him on his way, from high-school teacher Bill Miller, to Carroll's wife, Laurette—the book conveys an affecting portrait of a happy marriage—and to his generous neighbor and landlady in Warner, New Hampshire, the late Sibley Wilkins.

Yet Carroll's work transcends the road-less-taken form of its reflections. In his inspired and eloquent evocation of a particular American landscape—the hills and bogs of the north country—he recalls the 19th-century writer who chronicled, in vivid detail, the days as they unfolded at a pond we have come to know as Walden. ○

Reviewer ALINA CORDAY-TAYLOR is based in Washington, D.C. and in London.

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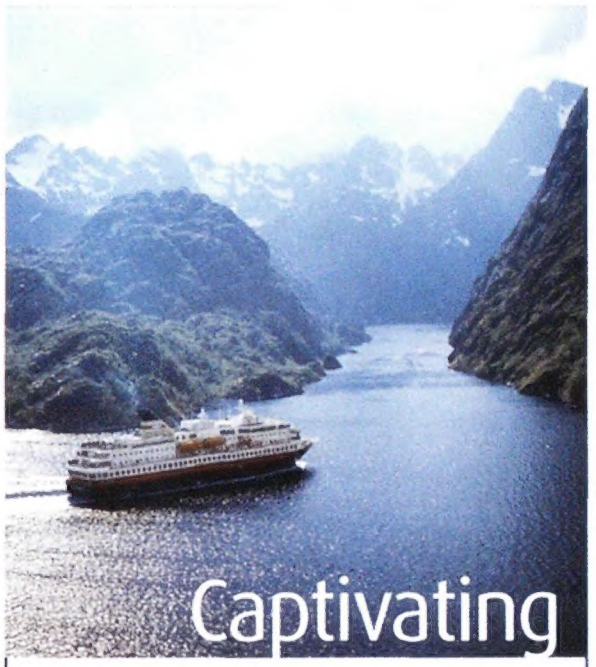

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No Chive Left Behind

Not since the launch of Sputnik *has U.S. education seemed so ripe for reform*

BY DANNY HEITMAN

"WHAT'S THIS?" the grocery cashier asked me, holding a tan melon at eye level. "I don't know how much to charge you, because I don't know what to call this."

"That," I answered, trying to hide my surprise, "is called a *cantaloupe*."

Taking my groceries to the car, I shrugged the whole thing off as a fluke. It's theoretically possible, I thought, stowing the last bag on the back seat, that a boy could pass the first 16 years of his life without cantaloupe consciousness.

A scant two weeks later, however, a subsequent trip to the supermarket brought an even deeper shock. I was once again at the register, waiting for a price check on paper towels, when I heard the scanner at the neighboring checkout come to a sudden halt.

"What do you call these?" asked the cashier, a young woman in high school.

"Honey," said the woman at the counter, shaking her head, "those are strawberries. Haven't you ever eaten a fresh strawberry?"

The cashier answered no, smiling without alarm.

The customer bolted from line and dashed to the produce section, returning with two more pints of berries.

"I'm buying these for you, dear," she told the cashier. "I don't want you to go through life without tasting a fresh strawberry."

I had excused the cantaloupe cluelessness as an aberration, but the strawberry-challenged teen suggested an ominous trend. I couldn't wait to tell my mother and sisters, who routinely gather at the Sunday dinner table and, like a Greek chorus, predict the End of Civilization As We Know It.

But my breathless revelations didn't even raise an eyebrow. "That's nothing," my mother responded. "I got a cashier once who had never heard of celery."

"I had to tell a cashier what cauliflower was," one of my sisters chimed in. "And don't get me started on cabbage."

Clearly, when youngsters can't tell an onion from arugula, what we are witnessing is a growing national scandal of produce illiteracy. Little wonder: my 7-year-old daughter and her peers get their required allotment of vitamin C from something called a fruit roll, a product in which such things as oranges are mashed to a pulp and pressed into a sheet of goo that looks like a highway reflector.

So I have a proposal. Let us embark upon a massive federal education program. We could call it No Chive Left Behind.

Let us commit that by the year 2010, we will have a cucumber in every classroom.

Let us daily drill our children with horticultural flashcards, so that they can distinguish, in the blink of an eye, between a Burgess buttercup squash and a Royal Chantenay carrot, between Clemson Spineless okra and Bambino eggplant, between the Cherry Belle radish and the Walla Walla onion.

Let us sponsor fifth-grade essay contests that celebrate the bounty of our fields, asking our next generation to ponder, in 500 words or less, "The Cayenne Red: Pepper Pretender or Farmer's Friend?"

Let us start even earlier, retooling our kindergarten aquariums for potato production through a cheerful new curriculum, "Hooked on Hydroponics."

Without such an effort, the implications could be grimmer than the launching of *Sputnik*: while our next crop of Americans struggles to distinguish a green bean from a spaghetti squash, the Japanese plunge ahead with startling advances in the Fuji apple, and rumors abound of German ambitions to build a Master Zucchini. If we act now, our nation can once again become produce-savvy, securing its future as the apple of the world's eye.

And if you don't know what an apple is, I don't want to hear about it. ○

We welcome submissions for the Last Page, including original humor pieces and personal essays. They may be e-mailed to lastpage@simag.si.edu.edu or sent by regular mail to Last Page Editor, Smithsonian Magazine, MRC 951, P.O. Box 37012, Washington, D.C. 20013-7012. Alas, because of the volume of submissions none can be returned.

KATHRYN ADAMS

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